FOOD MANUFACTURE

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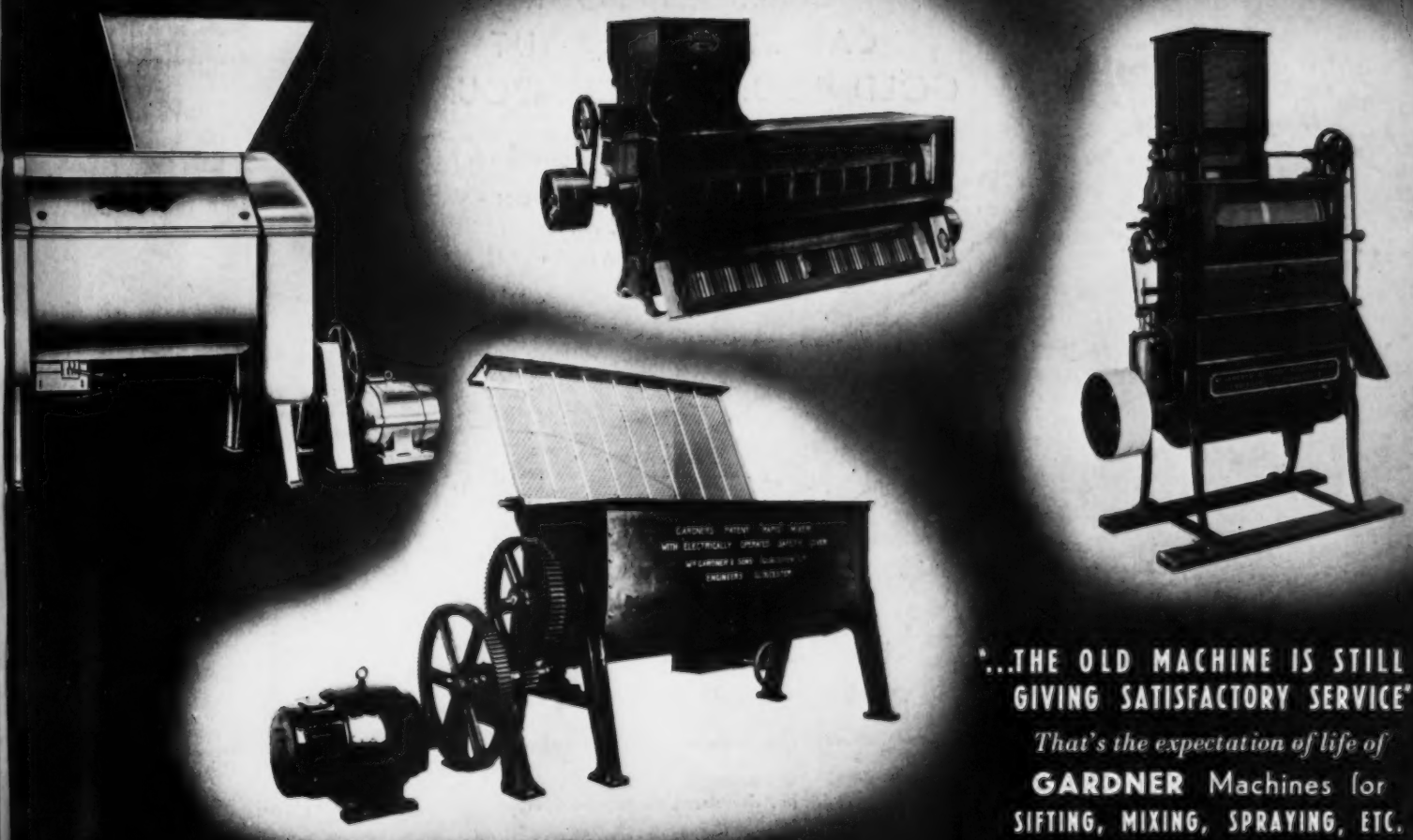

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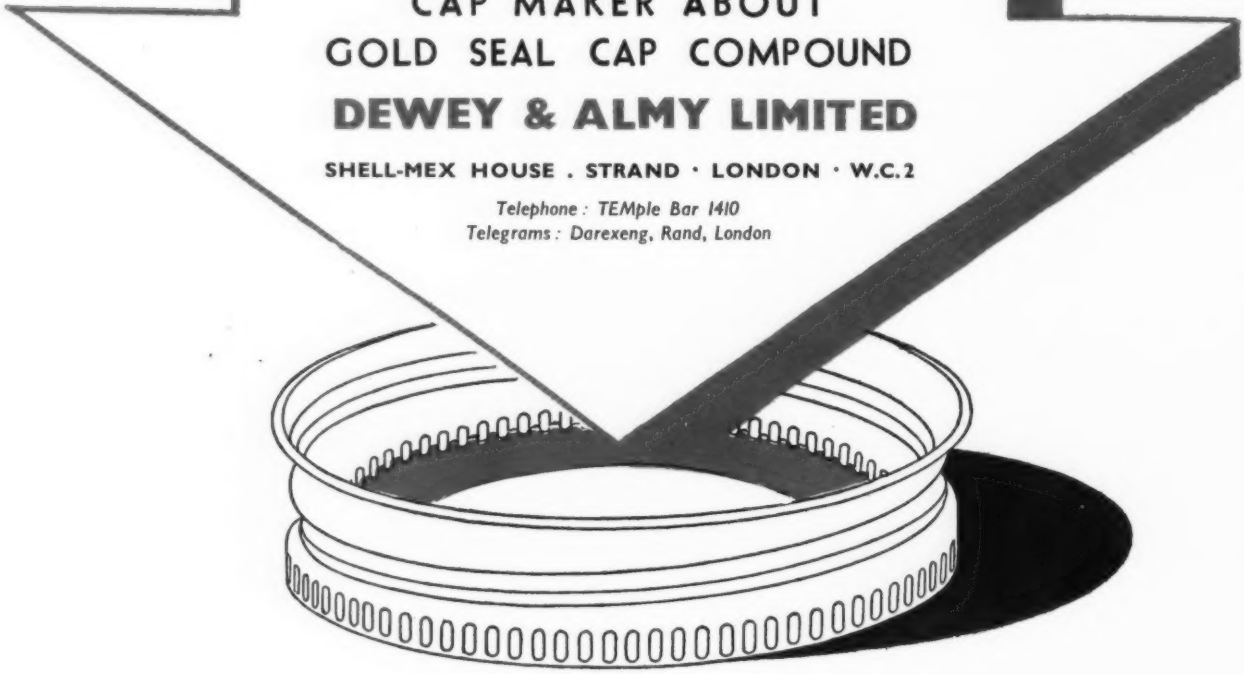

A JOURNAL DEVOTED TO THE PRODUCTION AND MANUFACTURE OF ALL EDIBLE COMMODITIES INVOLVING A PROCESS OF MANUFACTURE.

FOOD MANUFACTURE

Incorporating Canning, Packing and Preserving.

VOLUME . . . XIV

NUMBER . . . 2

FEBRUARY . 1939

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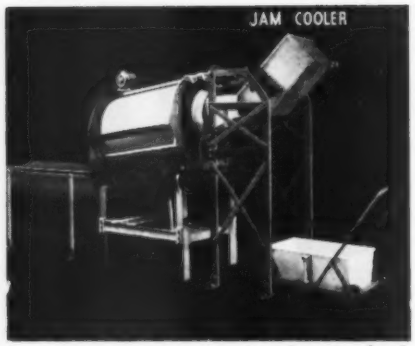
The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.



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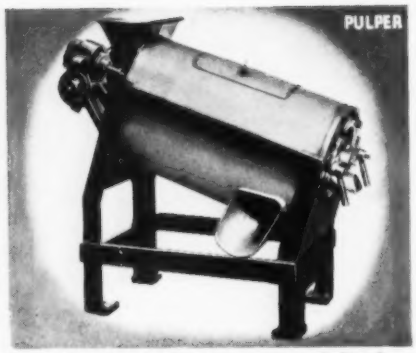

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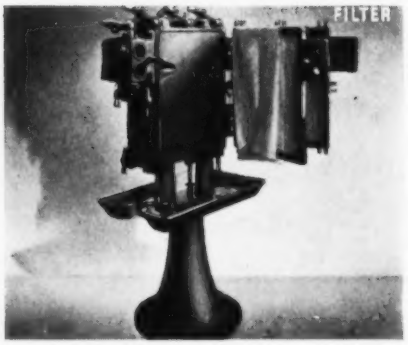

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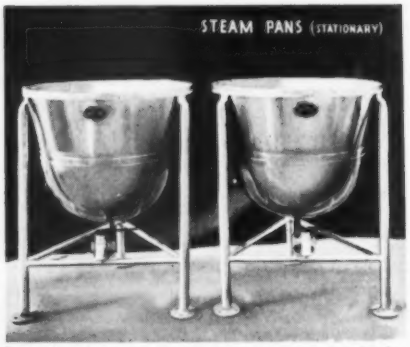

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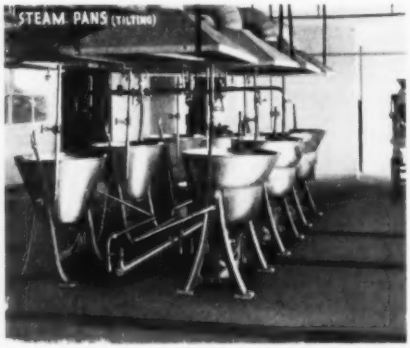

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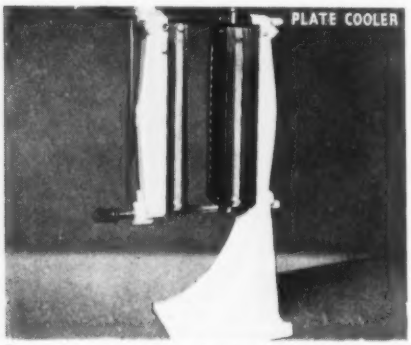

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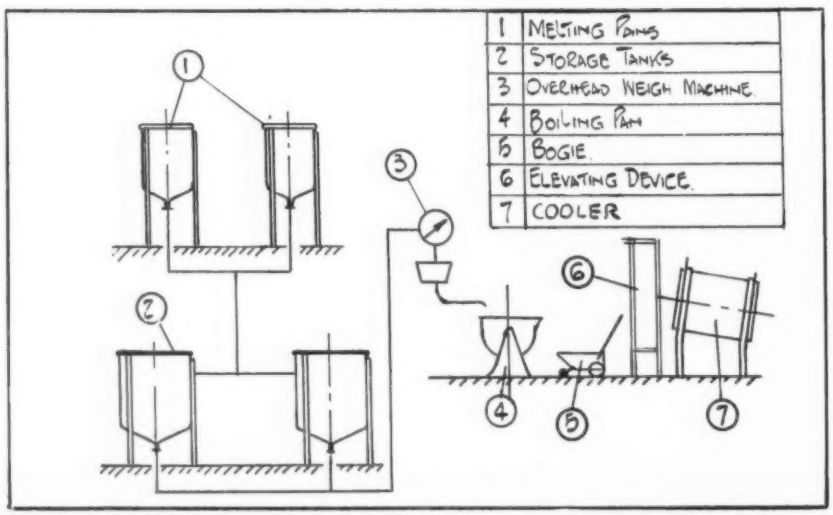

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FOOD MANUFACTURE

Vol. XIV, No. 2 February, 1939

1939

MAYBE IT is possible to view with better perspective the implications of a new year when it is already a month old. With better criterion the durability of those good resolutions may be assessed. The misdating of cheques and letters is a thing of the past.

Some years ago the editor of an American contemporary wrote a cheerful New Year message: "What's all this gloom about? It is the dawning of the year. No storm yet, no wind, no rain. Just a flush on the far horizon. Everything new and fresh and fine. . . ."

Internationally, the "flush" on the horizon may, perhaps, resemble a warlike red, and one of the most important things to be pressed on is food storage for defence. Not for one single moment should this be lost sight of. Apart from other angles, when we consider the enormous amount of available cold storage space in the country, we wonder why it could not be utilised for meat. The matter of the ultimate disposal of frozen meat thus stored may at first sight seem a problem—but there is always the can as its ultimate destination.

This year should see a great development in the pure fruit juice trade. The technical difficulties have been largely overcome. We have tasted the products made at Long Ashton and Wisbech, and found them good. But this country has sadly lagged in this matter. We are informed that no less than 52 per cent. of beverages consumed in certain continental countries are of the nature of fruit juices. The output in Germany is enormous. In this country anyone who went into a "pub" or even a *café* and asked for fruit juice would be accounted a crank, but there are signs that the dry bones are moving, repercussions of which will not only be good for trade but for the physical fitness of the community.

Frozen foods are with us—still on a minor scale. But 1938 saw a definite start and there is no reason to think that we shall ever look back. Quick-frozen food doubtless will become an adjunct to modern conditions of living. They will not, or should not be, luxury food. With larger scale working and continuous improvements in methods they should in a few years become culinary commonplaces.

And who knows what other striking novelties will be developed in the near future? There is no finality with science, which is becoming increasingly the handmaiden of the industry.

Home Food Storage

In view of our editorial ("Practical Food Storage") in the March, 1938, issue of this journal, we were interested in Sir Auckland Geddes' remarks on home storage of food made during his speech at Beckenham on January 17. In connection with A.R.P., he said, "The Government is making all arrangements for feeding, but remember, these arrangements may not always work". It would make, he said, a tremendous difference if housewives would have a little more food in a long-keeping form in their cupboards, and that this would not come under the category of hoarding.

Discussing the policy of secrecy, Sir Auckland said, "There is too much secrecy. I wish a lot more could be told. I wish the Press could carry it and let people know how much is done". We agree. There are too many rumours going around about what is or what is *not* being done in the way of food storage—mostly the latter.

We deplore one thing. In an interview with *The Daily Telegraph and Morning Post*, Sir Auckland is reported to have suggested oatmeal, sugar, "bully beef", sardines and *pilchards* among suitable foods to be stored. Why pilchards—mostly imported from California—when good British canned herrings are available? Pity 'tis that, albeit inadvertently, a foreign product, readily replaceable by a British one, should have received such an excellent advertisement.

Vitamins in Cooked Foods

In our August, 1938, issue we discussed the table of vitamin content of foodstuffs published in *Nutrition Abstracts and Reviews*, volume 7, No. 4. When that table appeared it was stated that a table of the vitamin content of cooked foods was being prepared. This has appeared in the second number

of volume 8. Mrs. Boas Fixsen has collected such "satisfactory" values for cooked foodstuffs as she has been able to find in the literature. By "satisfactory" is meant that the values have been obtained by biological tests carried out according to strictly defined rules, or by chemical tests carried out by methods accepted as adequate.

The tables are accompanied by a discussion on the effects of cooking processes on vitamins. In this, considerable attention is devoted to ascorbic acid (vitamin C). This is, no doubt, due to the fact that it is affected by cooking processes more than any other vitamin, and much research has been devoted to its behaviour and ultimate fate during cooking. While the tables are obviously far from complete they and the accompanying discussion do give some idea of the processes involved in cooking and canning, and an account of the effects these are likely to have on the vitamin content.

To say the least of it, a tabulated selection of authentic values is of real importance to the dietitian. Certain facts emerge which call for a revision of previously held views. While vitamins B_1 and C are affected by heat, the *p*H of the medium and any opportunity of oxidation in general, the losses from these are not so great as was previously supposed. Much loss hitherto attributed to destruction goes into the cooking medium and if this is consumed the loss is minimised. This applies to canned products, and it seems evident that the losses of vitamins in canning, especially if the container is evacuated and oxygen excluded, are not so serious as was formerly believed.

Lead in Food

The report by Dr. Monier-Williams on lead in food, recently published by the Ministry of Health, marks the culmination of much intensive research work on the advent to and effect of lead on the human metabolism. Work carried out in 1930 at the Government laboratory, in connection with the departmental committee on ethyl petrol, showed that the presence of lead in human urine was almost universal. The amount excreted via the kidneys, although small (average about 0·05 mg. per day) indicates at least an equivalent and regular intake.

Whence comes this? The obvious sources are from dust or vapours in the air and from food or water. If the lead has reached the kidneys via the lungs (*i.e.*, dust or vapours) it will have entered the systemic circulation and may be distributed in all the organs of the body. The bones contain more lead than any other tissue, and they appear to store the excess of lead received from the blood. Some of the lead entering the alimentary tract is absorbed by the blood and leaves via the kidneys, but part is stored.

In view of all this, the report on lead in food by such an authority as Dr. Monier-Williams is of considerable importance. No fresh or canned fruit was found to contain as much as one part per million of lead, but peaches had 0·9 and bananas 0·6 part.

Imported canned peas, drained from liquid, contained no lead, but the home product contained 0·8 part, dried peas 1·1 parts and fresh green peas 0·2 part. Milk foods were mostly free from lead, but fish gave various results. Probably the 8·3 parts in sardine paste and 5·1 parts in silds came from the cooking utensils. Curry powder may contain a lot of lead because lead chromate is used to improve the colour of turmeric.

Monier-Williams concluded that "no general limit for lead applicable to all foods would be satisfactory. . . . The aim should be to reduce the total amount of lead ingested in the diet to the lowest possible amount and to this end every endeavour should be made to ensure that individual foods are prepared in such a way as to eliminate lead contamination as far as possible".

Farmers Disappointed

Many farmers went to the fourth Oxford Farming Conference early this year hoping for a further pronouncement from Mr. Morrison on the Government's farming policy, but they were disappointed. The Minister of Agriculture was in good form and was the essence of affability, but even what he himself described as a "friendly atmosphere" did not bring him out, and as to policy he was silent and confined most of his remarks largely to the question of land drainage.

Mr. Hart Synot in proposing the toast appealed to Mr. Morrison to make someone responsible for giving up our "archaic system" of managing ditches and water-courses and adopting up-to-date methods. The Minister agreed that drainage was essential before applications of lime and slag could be of any benefit and that was why special drainage clauses had been included in the 1937 Agriculture Act. He pointed out, however, that the outfalls for the country (the rivers) had to be considered first and that work was proceeding on these. Internal drainage boards had, so Mr. Morrison said, responded very well to the system of special grants for which the Act had provided, but the response of the County Councils had not been so good.

One cannot help feeling that he was playing for

time. He must realise that it is no good telling a hill sheep farmer that he can get a grant for drainage or a Lincolnshire barley grower that there are facilities for cheap basic slag. These people cannot afford to wait until the benefits of river widening become apparent. Many of them will be dead by that time. What they need is immediate help.

Self-Help by Farmers

It is always refreshing to find people trying to help themselves, and the main theme at the Conference was what the farming population themselves can do to bring about a return to prosperity in their industry. Farmers and estate owners foregathered with economists, scientists and other theorists in a frank and open discussion on those perplexing problems that so far the Government have completely failed to solve.

The complex nature of the situation is evidenced by the very large body of experts—someone said nearly as many expert advisers as inexpertly advised people in the industry.

Mr. Orwin struck the right note when he said that whatever the State might do, nothing could relieve the individual of the responsibility of making full use of all the resources at his command. The best way by which to justify the State aid the industry needed to-day was by taking every means to ensure that each individual's business was as efficient as all his energy and skill could make it. State aid must never be allowed to take the place of self-help.

This is sound advice and farmers would do well to follow it. There is too much crying out to-day for spoon feeding, but the old saying that "God helps him who helps himself and God help him who doesn't" is full of truth. The presence of so many practical farmers at the Conference was evidence of a keen desire on the part of many to apply business methods to their farming, and it seems evident that the keynote was that the future well-being of agriculture will depend at least as much on reorganisation with the industry as on changes in official policy.

Milk Nutrition Tests on Calves

The Milk Nutrition Committee have recently issued a third report on milk and nutrition. The first dealt with the effect of pasteurisation on small laboratory animals, the second on the effect of milk on the growth and development of school children. The recent report deals with the results of three experiments in which the calf was the test animal.

The tests were made at the National Institute at Shinfield and at the Rowett Institute, Aberdeen. The calves were divided into two comparable groups, one of which received pasteurised and the other raw milk.

At Reading eleven pairs of calves from tubercle-free herds received the milk for a period of six months.

At the beginning the live weights of the calves were almost identical. The rate of progress was uniform. Small supplements of solid food were given in the later stages, but there was no difference in the appearance of the calves of the two groups, in the amount of food they took or in the chemical analysis of their blood. Those taking raw milk showed a slight but insignificant advantage in depth of chest, height at withers and girth depth.

At the end of the test tuberculin tests were applied: eight fed on raw milk and one on pasteurised milk gave positive reactions. A similar test was carried out at Aberdeen. The conclusions drawn from these experiments are that raw and pasteurised milk have an almost identical nutritive value for calves and that there is a considerable risk of spreading tuberculosis among calves given raw milk. The consideration of the bearing of these results on human nutrition is reserved for a later report, in which the complete investigation on school children will be described.

The New Nutrition Panel

The general idea of the new Nutrition Panel of the Food Group of the Society of Chemical Industry may be summed up in the words of Mr. A. L. Bacharach, its honorary secretary: "The more far-seeing food chemists have come to realise that their products are in fact intended not only to be eaten but, what is more, digested. They feel, therefore, that it is essential they give increasing attention to the vital subject of nutrition, so that they may keep pace with the strides of modern scientific research in this subject.

"The places at which food chemists, microbiologists and medical men can meet upon common ground have been few in the past. It is to be hoped that the new panel will provide just such a common meeting-ground as has been missing."

Chairman is Professor J. C. Drummond, Professor of Biochemistry at London University, and Drs. G. W. Monier-Williams, Albert Green and Magnus Pyke are on the committee. The scope of the panel will include the production, processing and distribution of food for both human and animal consumption, and the manufacture and control of

preparations for supplementing diets for medical use in nutritional disorders. Membership is open to all members of the Society of Chemical Industry and the Food Group, and regular meetings will be arranged for 1939.

We feel that the counsels of the members of this new body and the collaboration of those who attend its meetings may serve to stem the flood of misconceived and extreme ideas which are the inevitable by-products of a " new " science. There are many aspects of nutrition which are still wrapped in mystery. The much-blazoned protein-carbohydrate incompatibility, for instance, seems to have been debunked to the satisfaction of most dietitians. Their scientific reasoning seems unassailable and we have nothing to suggest against it. But the curious part of the matter is, so far as we ourselves are concerned, that the system works! However, that is another story.

One of the pleasing features of Nutrition Panel is the willingness of leading manufacturers to allow chemists in their employ to disseminate the results of their work for the general good. This is a good departure from the old method of guarding " trade secrets " which are for the most part illusory.

Is Beer Best?

" Concerning beer, I have hardly patience to deal with the often suggested and sometimes vaunted nutritional value of that beverage. The claim when not wholly insincere is ridiculous. We all know that whatever aid to physical fitness other measures may provide for the poor, and, indeed, for a large section of the wage-earning class, provision for better nutrition is the most to be desired. It is unfair and even cruel that propaganda, subtle, suggestive and intensive, should endeavour to persuade the worker that his beer makes him more robust and increases the power of his muscles."

Thus Sir Gowland Hopkins, in the recently published work, *Alcohol and Human Life*, by Courtenay C. Weeks, M.R.C.S., L.R.C.P. Far be it from us unduly to decry the " anæsthetic which enables the working man to undergo the uncomfortable operation of living ", but it is certainly a pity for him to be under any delusions about it. That the delusion is well presented a mere glance at almost any hoarding will demonstrate.

We are wondering whether the future generation will be one which is imbued with the fixed idea that, among other things, the inbibition of quantities of beer during the day, and patent beverages to get rid of the CO_2 in the blood at night, is the way to physical fitness. Perhaps the " Fitter Britain " people will take a hand?

Super-Magnification

There comes news of an ultra-microscope capable of a magnification of a million times. This was demonstrated in Virginia, U.S.A., by Dr. Zworykin, director of the Electronic Research Laboratory.

Employing a magnetic field in place of the optical lens, and a fluorescent screen in the rôle of eyepieces, images appearing thereon are visible to several observers at once. Optimistically stating that he believed that the limit of magnification had not yet been reached, Dr. Zworykin showed his interested audience of several hundred the spectacle of an atom enlarged to a diameter of about an inch, and bacteria in great detail.

Although it is early as yet to form a final opinion, it seems unlikely that instruments such as this will come into general use, owing both to expense and complication, but research chemists in food and other fields can hardly fail to be interested in further news of this development.

Dairy Science

Workers in dairy science will have a wealth of information at their disposal as a result of the establishment of the Imperial Bureau of Dairy Science at Shinwell, near Reading.

One of the main functions of this bureau is to index research work in dairy science, whether it be carried out in the Empire or elsewhere; to collect, abstract and collate information bearing on dairy science and to distribute this information both by publication and private communication to research workers, officials and advisory officers throughout the Empire.

The bureau will deal with a wide field of dairy science, embracing microbiology, chemistry and physics of milk and its products; animal diseases in so far as they affect milk and its products and the technology of processing milk and manufacturing dairy products.

The establishment of the Imperial Bureau of Dairy Science comes in answer to the many requests for a clearing-house of information. It has as its director Professor H. D. Kay, director of the National Institute for Research in Dairying, and Mr. W. G. Sutton, from Massey Agricultural College, New Zealand, has been appointed deputy director. Doubtless research workers and workers in the dairy industry generally will avail themselves to the greatest extent of the service offered by the bureau.

TUBERS MADE TASTY

It took 300 years to get potatoes into paper bags. How it is done is described in T. Crosbie-Walsh's review of one of the factories of Smith's Potato Crisps, 1929, Ltd.

THE POTATO was first introduced into Europe by the Spaniards, and grown by them in Spain. It appears to have found its way from there to Italy, where it was extensively cultivated, and thence to Vienna. Its introduction into England is attributed to Sir Walter Raleigh, who is said to have received a supply on the return voyage of a ship which took out a number of colonists to Virginia in 1584, and planted them on his estate at Youghal in Ireland.

Gerade, the old herbalist, gives an illustration of the potato in his *Herbal*, published in 1597. In the reign of James I the potato was regarded as a great delicacy, and in 1662-63 the Royal Society urged its members to plant potatoes to provide the masses with food in case of famine.

Frank Smith Starts

People went on and on eating potatoes—doubtless boiled, fried, baked, etc. (one *chéf* claims that there are eighty ways of cooking them), for over three hundred years until 1920, when a gentleman of the name of Frank Smith (who incidentally is the seventh son of a seventh son) started, with a thousand pounds of his own capital plus another nine thousand, the production of fried potatoes in paper bags, now know universally as Smith's Potato Crisps.

Young Frank Smith started traditionally in business at a few shillings a week, but with an eye to advancement went round the corner to a grocery shop where he worked behind the counter for five shillings a week, living in. One day he walked into another grocery business—Carters, who were handling potato crisps.

Some of Frank Smith's lucky friends who put five hundred pounds in the original business could now sell those shares for over thirty thousand pounds.

Mr. Smith's first factory was started in 1920 with a staff of twelve girls, and it is an interesting point that six of these original operatives are still working with the Company.

Ten Factories

Smith's Potato Crisps, Ltd., now have ten factories—at Brentford, Cricklewood, Birmingham, Portsmouth, Stockport, Hayes, Paisley, Great Yarmouth, Bristol, and Lincoln—and eight depôts. The Brentford factory situated on the Great West Road is a typical one and functions as the head office of the Company.

The Potato Store

Entering the factory by the huge store, one is confronted with bags of potatoes piled above each other in tiers. Forty thousand tons of potatoes per annum are handled by the Company, which possesses an 8,000-acre estate devoted to potato culture for the special purpose of making crisps, in Nocton, Lincolnshire. This, however, is not sufficient to keep the factories going and supplies are obtained from other sources.

". . . Entering the factory by the huge store, one is confronted with bags of potatoes piled above each other in tiers. Forty thousand tons of potatoes per annum are handled by the Company. . . ."

Washing Machines

Along one side of the store are ranged the washing machines, which consist of revolving baskets above which are fitted water sprays. Speedily and efficiently washed, the potatoes are loaded into baskets and taken to the cooking department.

On another side of the storeroom, along the wall, are set the gas meters—so big that their identity is not manifest at first sight.

The Cooking Room

In the huge cooking room are ranged a large number of cooking vessels, which consist of shallow pans resting upon supports which enclose the gas burners. At the side of each cooker is the slicing machine, and the raw potato slices fall direct into the hot oil contained in the vessel. A constant supply of vegetable oil is delivered from a pipe over the vessel. The oil is stored in large tanks and no less than 5,000 tons per annum is used. The slices are cooked by workers who are skilled by long experience at their job. The individual batches are small and may thereby be cooked, in culinary parlance, "to a turn".

Smith's Crisps, Ltd., pride themselves upon the high and standardised quality of their product and attribute it to their adherence to certain varieties of potato and to their cooking methods.

The cooked crisps are removed by baskets and placed upon inspection tables. Here skilled girls eliminate any faulty crisps, and the familiar golden-brown product falls through a chute to the packing floor below.

Packing into Bags

One of the main preoccupations of those concerned is to get the crisps after cooking into moisture-proof bags with the least possible delay, as any absorption of moisture would destroy one of the qualities to which the success of the crisps may be ascribed and which are inherent in their very name.

Twists of Salt

On emerging from the cooking room, a *detour* is made to the department where the familiar little blue "twists" of salt are prepared. In former days salt was supplied in little flat envelopes, which were filled automatically,

". . . the washing machines, which consist of revolving baskets above which are fitted water sprays."

"In the huge cooking room are ranged a large number of cooking vessels, which consist of shallow pans resting upon supports which enclose the gas burners. At the side of each cooker is the slicing machine. . . ."

and it was only after a considerable amount of engineering research had been done that a machine was designed to do the same thing with bits of blue paper.

The paper is contained on a roll. The machine cuts it into the requisite size. It is carried on to the plate of the machine, which presses it into a small hole. The required amount of salt is next delivered into the opening, after which come the final operations of twisting and delivery into a receptacle. Human intervention is restricted to the fixing of a new roll of paper and the replenishing of the salt supply when necessary.

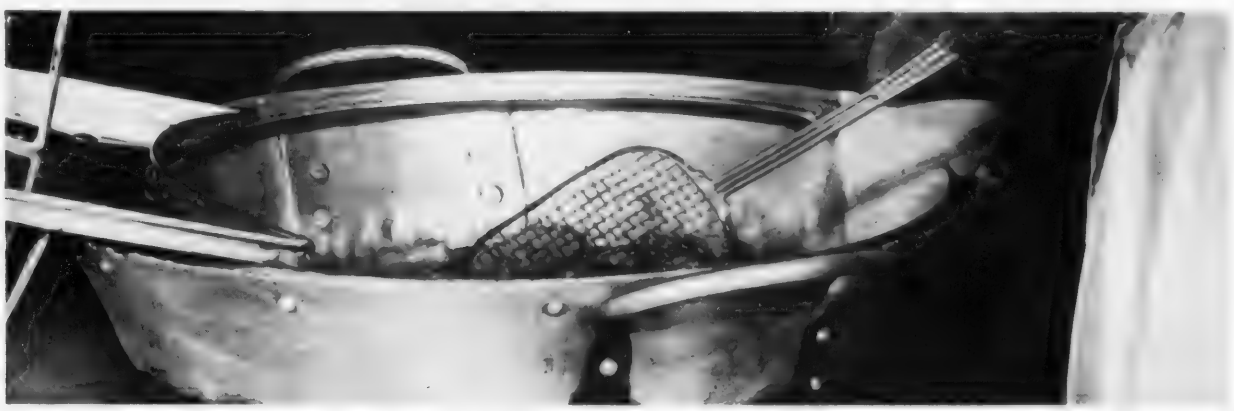
Music in Industry

In all the departments large wireless loud-speakers are installed, and while I was watching the cooking Gracie Field's voice enlivened the proceedings, and the choruses taken up by the numerous workers made the somewhat prosaic job of potato frying take the aspect of a musical festival.

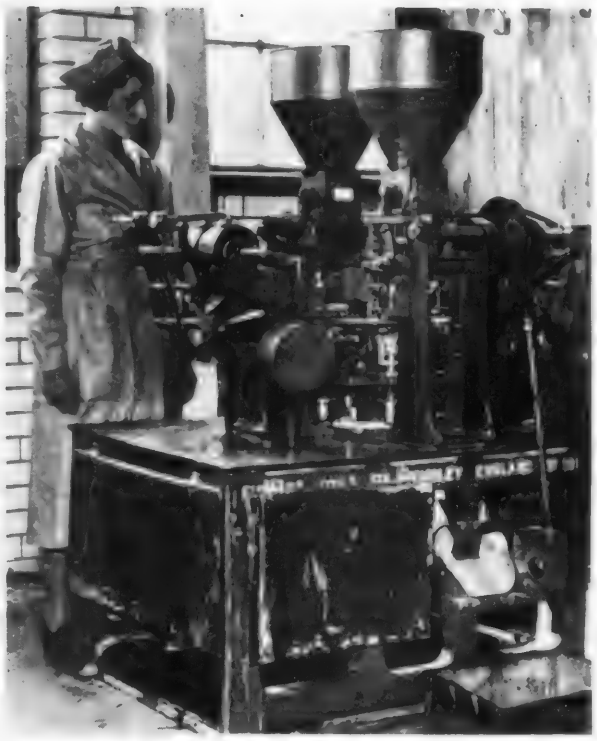
The experiment has, of course, been tried in other factories with some success, and the directors of Smith's Crisps, Ltd., are well satisfied with its results, and assured me that the wireless programmes did not distract attention from work of routine character, and that the psychological result was excellent.

Packing Tables

On the floor below the cooking room numerous chutes convey the completed crisps to the packing tables. Here girls are on piece-work. The paper packets are filled



A "close-up" of one of the shallow cooking pans, with an operator stirring the contents. On the right can be seen the chute leading from the slicing machines down which fall the thin chips of potato.



Here is the machine which makes the little blue twists of salt contained in each packet of crisps. The paper is contained on a roll. The machine cuts it to the requisite size. It is carried on to the plate of the machine, which presses it into a small hole. The required amount of salt is next delivered into the opening, after which come the final operations of twisting and delivery into a receptacle.

MR. FRANK SMITH.

In 1920 he started one factory with twelve girls. To-day some of those original employees are working in one or other of his ten factories.

without weighing, but a personal check demonstrated that there was never more than the difference of one crisp between any two packets. This is pretty good packing considering the nature of the material.

The entire operation—filling, introducing the twist of salt, and the closing of the packet—is done by one girl, upon the completion of which she puts the packets on a tray, together with a tab which identifies her work for costing purposes.

The system works very smoothly and economically so far as the checking department is concerned. The capacity of a skilled girl at the job of filling the packets reaches 3,000 per day of 8 hours, which is 6¼ per minute or a packet every 9·6 seconds

Into the Tin Boxes

After having been checked for the purpose of assessing the piece-work, the packet-laden trays are delivered to the tables where packing into the tin boxes is done. There are eighteen packets to the tin, and again it is a skilled job not only to get them in but to do this without damage. The tins are used over and over again, the retailer being charged 1s. deposit. Labelling is done by hand. No machine apparently has been designed that will satisfactorily handle such large tins. The adhesive is contained in a shallow tray in which is suspended a

"... the packet-laden trays are delivered to the tables, where packing into the tin boxes is done. There are eighteen packets to a tin. It is a skilled job to get them in without damage."

sheet of canvas from which the brushes derive their supply of adhesive. No less than three labels are attached, so that all sides of the rectangular tin are covered save one. The work is done speedily—a girl being able to label as many as 1,760 tins in a day.

That is the whole process. Simple enough on the surface, but necessitating considerable organisation and planning, and running with the utmost smoothness.

Nuts and Raisins

Another line produced in the factories consists of brazil and barcelona nuts, almonds and raisins, and, judging from the huge piles of boxes of raisins seen stacked, the line must be a very important one.

Regretfully it was mentioned that, despite assiduous personal negotiation in the Colonies, it was impossible to obtain supplies of raisins of the right kind. So they come from California, and are certainly beautifully cleaned and prepared before packing into boxes in which they come—not a single stalk discernible, so that no handling is necessary.

Social Welfare

The Company provides the use of an excellent canteen, at which a substantial meal of meat, potatoes and vegetables may be had at the cost of a few pence. The two rest times of a quarter of an hour each (morning and afternoon) are enjoyed during the day. Ever since this factory started in 1920, holiday pay has been the rule. All employees receive Christmas bonuses which amount approximately to a week's wages.

SOME SUPPLIERS TO SMITH'S CRISPS, LTD.

Washing Machines: Mabbott and Co., Ltd.
Electric Motors: Crompton Parkinson, Ltd.
Electric Blowers: Keith Blackman, Ltd.
Tins: Huntley, Boorne and Stevens, Ltd.; Reads, Ltd.
Bags and Labels: E. S. and A. Robinson, Ltd.; E. Saunders and Son.
Trucks: H. C. Slingsby.
Transport: Albion Motor Co., Ltd.; Morris: Stewart and Ardern, Ltd.
Car Greasing System: Tecalemit, Ltd.
Lifts: Evans, Ltd.

" Labelling is done by hand. No machine apparently has been designed that will satisfactorily handle such large tins. The adhesive is contained in a shallow tray in which is suspended a sheet of canvas from which the brushes derive their supply of adhesive. No less than three labels are attached, so that all sides of the rectangular tin are covered save one."

Stretching its impressive length along the Great West Road the chief factory of Smith's Crisps, which also houses the Head Offices, is a striking example of modern industrial architecture among a distinguished company of palatial factories. A interesting point is the utilisation of part of the wall frontage for advertising hoardings.

BRITISH FRUIT JUICE—THE FUTURE?

Proposed Conference at Long Ashton

VERNON L. S. CHARLEY, B.Sc.

In comparison with other countries Great Britain has lagged behind in the matter of pure fruit juices. Chief among the fruits from which juice may be made is the apple. Here the raw material is, in years of good crops, a surplus, and as to its disposal, an acute problem. The author is not only one of the greatest experts on the subject of fruit juices but an enthusiast, as a perusal of his article will demonstrate. The coming conference in the Spring should attract scientists, business men, manufacturers and others.

THE PAST four years have witnessed a steady growth of interest in the production of pure fruit juices in this country. Research work was commenced at Long Ashton in 1932 to examine the possibility of utilising certain types of surplus fruit by its conversion into various stable liquid products. The first two years' work was confined to a preliminary examination of such products as fruit juices, syrups, concentrates, squashes, wines and vinegars.

On account of economic or practical considerations, it was seen that wines and vinegar did not appear to possess the necessary qualifications for immediate commercial development, but, on the other hand, there did appear to be definitely attractive possibilities for syrups and juices.

Syrups

Acting on this assumption, special attention was given to soft fruit syrups, and a completely cold process was evolved at Long Ashton for their manufacture. The products attracted much attention, and without the slightest suspicion of pressure from Long Ashton itself, the process was taken up by a number of makers. The writer, who was personally responsible for the process, was permitted by the Agricultural Committee to supervise the erection of plant and the first two seasons' production at a commercial scale factory equipped in Bristol solely for syrup production from soft fruits. Troubles naturally arose in a process which had been developed on a very small scale and suddenly applied to bulks of raw material of the order of 200 tons, but it could be said that at the end of the season all the major problems concerning pressing, filtration and stabilisation had been overcome. The co-operation between Messrs. H. W. Carter and Co. (the firm concerned) and the Research Station had been of the very greatest value, and their public spirit in pioneering a new process indicates a very considerable faith in the quality and ultimate success of the product.

Apple Juice

During the years under review, the writer has been responsible for organising a series of tours to examine the cider industries in various European countries, and it has become apparent both that the fruit juice industry was developing to a remarkable extent, and that the apple features to a very predominant extent amongst the fruits used. The German, Swiss and Dutch apple juice industries have assumed enormous proportions, and it was largely as a result of these contacts that apple juice as a separate and important section of the fruit products work at Long Ashton was investigated. Gradually the position has developed, and at the present time there are three factories producing apple juice in this country. The output is small and quite insignificant from the point of view of making any impression on the surplus apple position. But every new industry has to have a beginning, and it is considered that a very satisfactory start has been made.

Recent Developments

The fruit growing industry, having experienced two short crops, is apparently expecting a heavy crop in 1939. The surplus fruit problem in years of full or heavy crops has been one which has gradually become more acute, and with the increasing acreages now coming into bearing, a heavy or glut crop would present certain very difficult problems to the industry. Consequently many growers or associations of growers have approached Long Ashton with regard to the possibilities of erecting apple juice plants. Apart from the obvious difficulties of obtaining skilled technical control at quick notice, there was one serious omission in many of the enquiries received. There was no mention of how to sell the juice when once it was prepared! This particular feature—namely, the solution of the many marketing problems—does not come within the terms of reference of the Long Ashton Station, but it is certainly a point that needs the fullest possible investigation before the decision is finally made to commence production.

In view of the interest being taken, a general review of the apple juice position was given at the "Growers Day" function organised during the last Imperial Fruit Show at Bristol by *The Fruit Grower*. On the last day of the show a conference was called at the University to discuss, in an informal way, the steps needing to be taken to develop the industry along sound lines. The outcome of the discussions was, briefly, that the fruit-growing industry should organise itself to take some share (at least) in the development work and ultimately in the actual commercial production, and, secondly, that the earliest possible approach should be made to the necessary authorities to protect a pure fruit juice product from unfair competition from synthetic or highly sophisticated products. This last desideratum was considered to be of the greatest possible importance.

The conference at the University decided to request the Fruit and Vegetable Sub-Committee of the National

Farmers' Union to investigate the possibilities of the fruit juice industry, and to determine in what way official representations could serve a useful purpose. This request was acceded to, and a committee was formed and held a meeting in December. The various problems affecting standardisation are now being actively examined and in due course will be reported on and suitable action taken.

Syrups and Juices as Health Foods

During the past twelve months the writer has been associated with several very remarkable and well-authenticated cases of an improvement in children's health and definite easement of pain in adults as a result of the use of pure fruit syrups or apple juice. Many cases were of such a nature that there can be little doubt that the actual remedial factor was the fruit juice itself. Black currant syrup has been shown to be of great use for treatment of duodenal ulcers. No reason can yet be given for these interesting facts, representing as they do merely a haphazard accumulation of clear-cut improvements in health which have come to the writer's notice by virtue of his position at Long Ashton and on account of his having supplied the various juices. *Definite clinical evidence is badly needed to obtain the type of data which is so essential to determine satisfactorily the precise rationale of the treatment and the nature of the recovery.*

The Long Ashton Spring Conference, 1939

In view of the very many interesting phases of this fruit products problem, the suggestion that a conference should be called at Long Ashton in the spring was welcomed by the Director, Professor B. T. P. Barker, M.A., and although the date is not yet finally determined, it is certain that some such function will be held by invitation in the near future.

Economics of Selling

We have a series of high-class products, possessing many features of interest both from the flavour and health-giving points of view. The disposal of large quantities of these beverages would constitute a considerable blessing to the fruit growing industry, whilst their consumption must be considered as an important dietary factor. In the case of the pure juices and syrups, their importance in times of national emergency, such as war, may assume very large proportions. The economics of selling the juices are, however, not yet clear. The products are more expensive than some existing types of beverages. Some manufacturers consider that this is by no means a disadvantage, indicating as it does a certain superiority in the drink. Whether or no the public will pay extra for such a beverage is a matter for discussion, but it is certain that any special features connected with the beverage will have to be given prominence, and it will be the aim of the conference to discuss, in a general way, these various considerations. It is hoped that papers will be presented dealing, not with technical problems of production, but with matters concerning the general character of the various juices and their development and uses abroad. A full range of products will be made available for tasting.

Prices Must be Analysed

It is possible that some criticism may be advanced in connection with the desire to prevent the conference becoming a mere debate on prices. Prices must be considered, they must be analysed, and in many cases they are obviously of such importance that to proceed with production in the face of an adverse analysis of the various costings would involve financial loss. But the question of costs is one to which firms are wide awake, and it is entirely remote from possibility that any firm would be lured into production merely on the basis of what is said at a meeting or conference concerning the points and features of interest concerning fruit juices. What *is* important is to collect information, collate it and make it available to a wide circle of concerns which are likely to be interested in fruit products. The financial side of the prospective industry has recently been analysed by Mr. G. F. Goaman (*The Fruit Grower*, January 12 and 19). It is the feeling, however, of the existing industry that their products, correctly marketed, would eventually command a higher price than many of the synthetic products and that such prices would include a reasonable profit for the various interests involved.

The aim should be to examine the products, discover whether they have any true worth, and, undeterred by the Jeremiahs and doubting Thomases, proceed to the investigation of costs, etc., in the light of the available information. This will be the object of the conference. The method of approach matters everything in this connection. With some modification, Omar Khayyám's philosophy has much to be said in its favour:

> "'How sweet is mortal Sovranty'—think some:
> Others—'How blest the Paradise to come!'
> Ah, take the Cash in hard and waive the Rest;
> Oh, the brave music of a *distant* drum."

The conference should succeed in "taking the cash in hard" as it concerns fruit products, and, should there be any "brave music", transpose it into active support for the furtherance of the industry.

Flux Inclusions Cause "Sweating" Tinplate

TINPLATES stored in a damp place sometimes become covered with droplets of liquid, a defect known in some works as "sweating". Paul Rocquet now shows in Publication No. 80 of the International Tin Research and Development Council that inclusions of zinc chloride trapped under the tin coating are responsible.

He states that every pit or fissure, which may be produced in the course of the pickling that precedes the tinning of the steel, may retain by capillarity a small quantity of flux which becomes an inclusion. As minute crevices are inevitable whatever the type of steel used, these flux inclusions are always present under hot dipped tin coatings.

In the case of steels containing silicon, a type of intercrystalline corrosion may increase the number of inclusions. However, by suitably regulating the pickling, this corrosion can be completely eliminated and the amount of flux inclusions considerably lessened.

Copies of this publication may be had free of charge on application to the Secretary, International Tin Research and Development Council, at their new offices, Fraser Road, Greenford, Middlesex; telephone, Perivale 4254.

CANNING HISTORY

An abstract of a lecture by Mr. E. F. EATON, A.I.C., on "The History of Canning." This was the first of a series on canning being given by experts this season at the Borough Polytechnic. The lecturer traced the subject from its earliest beginnings to the present day and this abbreviated account includes the results of painstaking researches into the subject.

TINPLATE, THE forerunner of our present product, appeared in Europe between the thirteenth and seventeenth centuries. Its origin is unknown, but doubtless there is some truth in the story of the unknown Cornish miner who, banished from this country in 1240 A.D., emigrated to Germany, where he discovered tin ore in the Erzegebirge. It was said that a statue to his honour stood in the Bohemian town of Awe in 1665.

Whether or not originally due to the discovery the miner made, the tinplate industry was firmly established in Bohemia, and had existed as a monoply there for many years prior to 1665.

There are records to show that much block tin was exported from Cornwall to Hamburg in the reign of Queen Elizabeth (1575 A.D.).

The process of making tinplate was a secret known only to the Bohemians, and they guarded their knowledge jealously. In 1620, however, the Duke of Saxony, whose lands lay on the opposite bank of the River Elbe, by resorting to subterfuge obtained sufficient information from Bohemia to found an industry. In thirty-five years the Saxon industry had completely outstripped its parent.

In 1660 the iron trade in England was in a state of acute depression, as also was the trade in tin. Andrew Yarranton therefore conceived the idea of starting a tinplate industry in this country and went to Germany in order to obtain the necessary secrets of the process. On returning to England he made sample sheets of tinplate, the quality of which was strongly approved.

As a result of Yarranton's efforts the tinplate industry was established at Pontypool about 1670, under the direction of Capel Hanbury. Unfortunately, no sooner had work begun than a set-back was experienced. An impostor, named Edmund Hemming, was granted a patent in 1691 to manufacture tinplate in England, but Hemming was so ignorant of the process that he was unsuccessful in producing a single sheet of usable plate. The moral effect of the granting of the patent was so great that Hanbury abandoned his project.

Thirty years later Hanbury's son John revived the trade at Pontypool, and met with great success, which was crowned in 1728 by his invention (claimed simultaneously by John Payne), which enabled him to roll out his iron base plate, instead of beating it out by means of hammers.

de Reamur wrote a paper in 1725 describing the existing methods for making tinplate in which "sour waters" were obtained by fermenting rye and other cereals, which now have been replaced by hydrochloric or sulphuric acid. de Reamur describes the art of tinplate making as "to render the sheets fit for tinning at a small cost and to tin them perfectly."

The "perfect" tinning has not been achieved, at least on a commercial scale, to this day. The coating on the finest tinplate available, containing as much as 12 lbs. of tin per basis box, is seldom, if ever, free from pores—*i.e.*, tiny holes which leave the iron base plate exposed.

Food Preservation Before 1800

Prior to 1800 the three methods available to man for preserving food were: (*a*) Freezing, (*b*) dehydration, (c) addition of chemicals, such as salt, vinegar, sugar, smoking, fermentation, etc.

About this time Napoleon had conducted an unsuccessful campaign in Russia, due in a large measure to the fact that he was unable to find sufficient food for his army. No method was known whereby fresh meat, vegetables, fruit, etc., could be transported that long distance without wholesale spoilage.

The Story of Appert

The story of Nicolas Appert is well known, but may be briefly recapitulated here. He was born near Paris in 1752, and had spent most of his life in kitchens, wine cellars and vineyards. He was not what is commonly called an educated man, though possessed of true scientific instincts. He carried out a large number of experiments on preserving food products with closed bottles as containers. Appert used French-made tin cans at a later period, but condemned them as unsuitable. He sealed his bottles by means of corks, bladders, parchment paper and such domestic expedients as layers of fat. His perseverance was rewarded in 1804, when he was able to submit a range of products to the Minister of Marine at Brest for testing. Three months later the Board of Health sent a public record to the Minister of Marine which consisted of eulogistic reports on broth, boiled beef with broth, beans and green peas with and without meat.

In 1806 consignments of Appert's preparations were shipped on Government vessels, some to places in the far north, others across the Equator to lands in the southern hemisphere in order to discover the effect, if any, of extremes of temperature, humidy and transportation. Reports by ships' captains and maritime prefects at shipping ports were highly favourable.

The Minister of the Interior awarded a prize of 12,000 francs to Appert on condition that he wrote an exact

NICOLAS APPERT

. . . gave his secret to the world for 12,000 francs.

description of his process and deposited it, printed in book form, at the Consulting Bureau of Arts and Manufactures. The book, entitled *The art of preserving all animal and vegetable substances for many years*, was published in 1810. Further editions were published in French, and it was translated into English, German and Swedish in less than a year of its first appearance.

Birth of the Food Preserving Industry

Thus was born the food preserving industry. With his 12,000 francs Appert set up in business, and that business is to-day being carried on in the true Appert tradition by his descendants.

The claim has often been made that the preservation of food by heating in closed containers was well known before the time of Appert. In 1680 *A Book of Receipts according to the Newest Method*, containing a complete direction for preserving fruit in bottles, was published in London, but it received no attention.

Scheele, the famous Swedish chemist, advocated in 1782 preservation of vinegar by boiling it, pouring it into bottles while hot and immediately sealing with a layer of oil, but again the idea did not receive the attention it merited. In spite of this, it cannot be denied that Appert was the first person to apply the principles, on a scientific basis, to the preservation of foods in general.

Appert's claim to be the father of food preservation cannot be disputed, but, as he used glass bottles as containers until the latter part of his life, he cannot well be considered as the founder of canning.

Peter Durand

In the same year as Appert published his book, Peter Durand, a merchant of Middlesex, obtained a patent covering the use of tin containers for preserving food.[1] He admitted that his method was communicated to him by " a certain foreigner residing abroad ". Durand, however, did not engage in canning on a commercial scale.

Early British Canning

The enormous commercial possibilities of the process were realised by Bryan Donkin, who the following year in association with John Hall, founder of the famous Dartford ironworks (now J. and E. Hall, Ltd.), built a new factory in Blue Anchor Road, now Southwark Park Road, Bermondsey, and commenced work on lines clearly based on Appert's method. After much experimentation and many failures, they finally developed a technique which was satisfactory, and in 1813 sent samples of their products to officials of the Army and Navy for trial. These two Englishmen, therefore, stand unchallenged as the founders of the modern canning industry.

As in the case of Appert, Donkin and Hall's products were sent on naval ships to various parts of the world. For example, in 1814 some were sent to St. Helena, and Admiral Cochrane, commanding the West Indian Station, wrote to England asking that samples should be sent to him. In the same year Donkin and Hall supplied preserved provisions to H.M.S. *Isabella* and *Alexander*, which, under the command of Admiral Sir John Ross, went on an expedition to Baffin Bay. Their products met with such favourable reception that the firm were soon supplying large quantities of foods to the Admiralty Victualling Depôt at Deptford. Drummond and Lewis[2] have ascertained that between March and December, 1818, 23,799 cans containing 46,360 lbs. of beef, mutton soups and vegetables were purchased by the Admiralty at a cost of £5,481 4s. 1d., and of this amount a quantity, value £1,642, was earmarked for the use of ships voyaging to the Arctic Circle.

Donkin's provisions formed part of the stores taken in H.M.S. *Hecla* and *Griper* when Parry set out on his first voyage of discovery of the North-West Passage in 1819, and they were so highly approved that, on his second and third voyages, Parry took very large quantities of preserved food, amounting to 79,000 lbs. weight. Numerous subsequent expeditions carried preserved foods, and the experience gained on these Arctic voyages was so convincing that preserved foods were added to the list of " medical comforts " carried by His Majesty's ships from 1831 onwards.

I have had the opportunity of examining certain of the records of Messrs. Crosse and Blackwell—and I have discovered two interesting and, from the historical point of view, important things. The first is that the business and goodwill, etc., of Messrs. Donkin, Hall and Gamble was acquired by this company at a date prior to 1850.

The second discovery was the existence of letters addressed to Messrs. Crosse and Blackwell, referring to the tinned provisions supplied under the names of Gamble and Donkin.

Two of these letters were written at different times by Sir John Ross, and in one he commends highly the food which he took with him on H.M.S. *Isabella* in 1818. With this letter came a small piece of Christmas pudding, which Ross said he had taken to the Arctic on his expedition of 1818, brought it back, taken it with him again on his next and brought it back again. After these two voyages he appeared to regard his pudding as something of a mascot, because he held it in safe keeping until November 30, 1852, when he opened the can and found the pudding still in excellent condition. In the same letter Ross mentions also a can of spiced beef, which was sent to Bermuda in 1812, returned some years later and found to be in good condition when opened in 1852.

The other letters substantiate Ross's statements, but one is of interest because it was written by Dr. Theodore Redwood, Professor of Chemistry at the Pharmaceutical Society of Great Britain, in 1878. It refers to a can of preserved meat, which was taken by Parry on H.M.S. *Fury* in 1824. It was landed with other stores on Prince Regent's Island in 1825 and recovered from there eight years later in 1833. Who kept it until 1868 is not known, but the can was opened by Redwood in 1868 and the contents shown to be sound. The following day a Dr. Letheby demonstrated the meat during a lecture which he delivered before the Royal Society of Arts. A copy of this lecture was published in the Journal of the Royal Society of Arts, 1868.

Evolution of the Can

No historical mention of canning would be complete without reference to the origin of the word "can".

For many centuries it was the practice of grocers and apothecaries to offer certain kinds of their wares—chiefly dry goods like spices, herbs, etc.—for sale enclosed in small baskets which were made of dried reeds. These baskets were called canisters, a word which originated from the Greek word "Kanistros", meaning a reed. On their introduction by Durand in 1810, tinplate containers by general consent were immediately called tin canisters. This title became abbreviated to "tin" in this country and to "can" in the U.S.A.

Mention has already been made of a patent concerning the use of tin containers for preserved foods, granted to Peter Durand, a merchant of Middlesex, in 1810. There is no record of the shape or method of construction of Durand's can, possibly because he did not enter into the business of canning on a commercial scale. It is, however, highly improbable that these first containers differed in any way from those produced by Donkin and Hall in 1813 and of which we have some excellent records.

These cans were made by hand and a laborious job it was too, as a skilled tinsmith could only make 60 per day, as will be readily appreciated when the operations involved in cutting the body blank to size, bending it into shape by means of a roller, soldering it down the side seam, then cutting discs, hammering the edges to make a flange and finally soldering these ends on to the body are considered.

It was only natural, in view of the labour involved in can-making, that the more enterprising spirits of the time began to look for ways of mechanising the process, and it was not long before numerous patent claims in this direction were made. It is interesting, however, to observe that motives other than increased speed provided the stimuli for invention. It is, in fact, possible to classify developments in can-making under three distinct headings, having for their objectives (*a*) increased output, (*b*) prevention of waste of used cans, (*c*) greater ease of can opening.

The last two objectives have resulted in some very interesting ideas. For example, in 1833 Pierre Antoine Angilbert obtained a patent[3] for improvements in tin containers. In his specification, after stating that his main object was to make possible the re-use of containers, he goes on to say, "whereas with the method at present practised of closing vessels, violence is requisite to open them (unless a workman expert at soldering is at hand), by which the contents are often and the vessels themselves almost always injured."

Angilbert's idea was that his can could be opened by melting the solder, and after removal of the contents, returned to the manufacturer, who would use it again.

The idea was not a great success, but the obvious advantage of the vent hole was recognised by other manufacturers who adopted it. It is curious that the other most striking thing about Angilbert's can—namely, that it was of the open top variety (the first of its kind, incidentally)—failed to make any impression at the time.

Filler-Hole Can

The standard container then was of the filler-hole type. The filler-hole was in use as recently as twenty years ago. It is also interesting to note that Angilbert's idea of a channel or groove for the solder is incorporated in a slightly different form. From the point of view of economy in solder this is an advance, but use of the filler-hole in 1918 can only be regarded as either retrograde or as being due to the state of emergency which existed in England at that time.

Can Openers and Can-Making Mechanisation

In the old days can openers were "cumbrous and expensive tools", and it was recognised in the very earliest stages of the industry that the difficulty of opening cans was a serious deterrent to the housewife. Therefore manufacturers began to explore the possibilities of devising containers which could be easily opened with such implements as were likely to be found in any household.

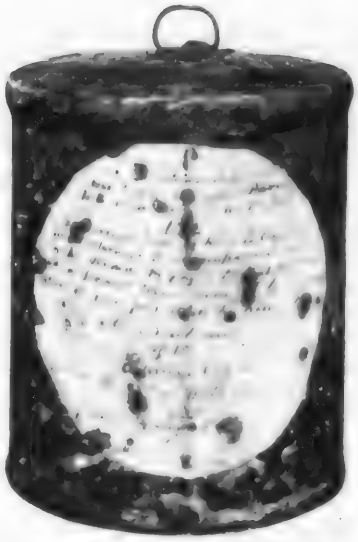
The first important development in this direction was due to Bouvet in 1862. The top of the can body was beaded, the edge of the lid was corrugated, the two were fitted together, and a wire was soldered in the channel so formed. One end of the wire was carried up out of the channel and the can was opened by tearing it out. Since then this idea has undergone a large number of modifications.

The familiar type of easy or "self" opening cans so popular to this day among sardine canners may be traced back to a patent obtained in 1871 by Widgery.[4] His original idea is still employed by at least one well-known French sardine canner.

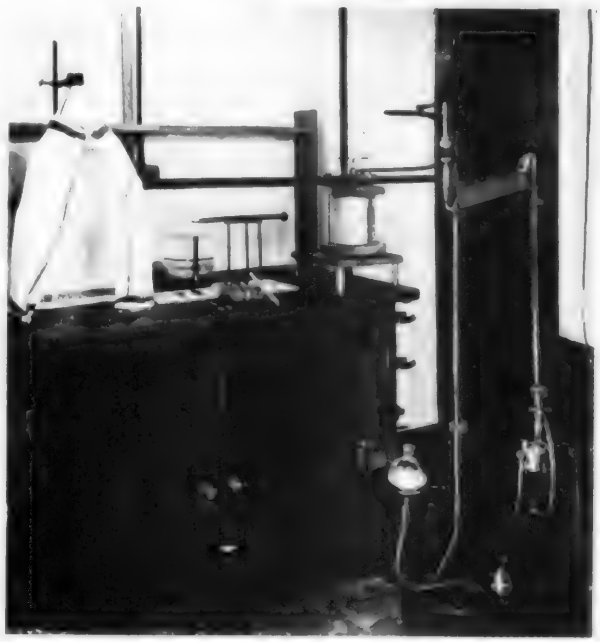
The first important development towards mechanisation of can-making was the invention of the drop-press by Allen Taylor in America, 1847. This machine converted flat discs into vertically flanged caps for the can ends by dropping a heavy die on to them. Two years later, Henry Evans, also an American, devised a pendulum press for the same purpose, and immediately afterwards certain improvements resulted in the first "combination" press, which cut out the discs from flat sheet tinplate, flanged them and punched out filler-holes in one operation.

Soldering-Frame

The next step was the introduction of the soldering-frame. This was a mandrel of such a size that the body



The can of Veal left over from Parry's expeditions to the Arctic Circle in 1824 and 1827. The can held 4 lbs. of veal and was made by the firm of Gamble, successors to Donkin, Hall and Gamble. It was opened in 1868 by Redwood. The bottom picture shows the apparatus used for the purpose.



blanks fit around it with just sufficient overlap to allow of a good joint being made. The overlap was held in position by a slate slab which, in addition, acted as a guide for the soldering-iron. This meant that the tinsmith had merely to run his iron along the seam. It was a quicker method, gave a better joint and required less solder. The ends were fixed on to the can body by means of a heavy circular capping-iron, which heated the whole of the end and often caused solder in the side seam to melt and run out.

In 1858 capping-irons were displaced when the method of fixing the caps by "floating" was introduced. The body, with the cap on, was rotated in a slightly inclined position with its lower end just dipping below the surface of a bath of molten solder under a layer of flux. A daily output of 1,000 cans per man was soon obtained in this way.

Machines for soldering side seams were introduced in 1866, and Howe, ten years later, patented a machine for soldering on the can ends. Numerous improvements were added, and by 1886 the whole process of can-making had become automatic.

Progress in can-making had, therefore, been rapid, but no great changes in the form of the can had been produced during the period, and from the food packers' point of view he was still working with Durand's can——all joints soldered and a filler-hole in one end. The purpose of the filler-hole was, of course, to reduce the amount of solder necessary for sealing the can after sterilisation and, therefore, it was kept as small as possible. This made the washing of the interior of the can difficult and slow and limited the size of objects which could be packed into it. In spite of these disadvantages the filler-hole type remained the standard container until about 1900, and even survived in different parts of this country until the end of the Great War. Since then, however, the open top or sanitary can has made tremendous progress, and its use although not universal to-day (*e.g.*, for condensed milk) is almost so.

The modern can, in addition to being of the open top type, has two other very great advantages over its predecessors, apart from the speed at which it can be made. These are the locked side seams and the double seamed ends. Their use ensures that solder has no opportunity of coming into contact with the contents of the can.

The "locked" type of side seam was probably known to tinsmiths at least a century ago and made by them by hand. It was not until 1861 that Peltier, in France, devised a machine which made it. Fletcher of Rochdale also obtained a patent for a similar machine in 1862, but the idea was not applied to food containers until the end of the century.

The attachment of can ends by double seaming was introduced about 1824 by Rhodes of Wakefield (a name highly respected in the engineering world of to-day). It is perhaps rather surprising that the method of double seaming made such slow progress during the nineteenth century, and the reason is to be found in the lack of a suitable gasket for use with the method. Patents were granted to several inventors who claimed to have devised machines of this type which gave hermetic seals, but it was not until 1888 that a really hermetic seal was effected. It was due to Charles Ams, son of the famous Max Ams, and success resulted from the use of a rubber solution in the lid. At first the solution was hand painted on to the lids by means of an ordinary brush, but within a very short time a machine was devised for the job. The present lining machines are the outcome of Ams's invention.

Corrosion of Tinplate

No sooner had a tribute been paid to the men who had overcome the problem of food spoilage than a new series of difficulties arose out of the liability of the tinplate container to corrosion. Externally, this was easily dealt with by applying a coating of paint, but corrosion due to the action of the contents on the can produced a problem with which men of science have been exercising their

(*Continued on page* 65)

MODERN FISH-RENDERING PLANTS

A CRITICAL RESEARCH BY

F. W. MARTIN, M.I.Mech.E.

ON ACCOUNT of the actual shortness of foreign exchange in the majority of European States, a rigorous and unreserved restriction of the importation of a great deal of industrial and semi-industrial products became imperative, especially if certain products could be manufactured in the country and if, furthermore, strategical interests required an absolute independence from foreign markets.

This tendency has given, particularly in the last few years, a considerable impulse to the industrial utilisation of abattoir and fish offal. Hence this utilisation of carcasses, fish and fish offal, etc., is no longer confined only to the sphere of mere private speculation and initiative, but has been converted into an important branch of industry which is the subject of careful investigations on the part of semi-official corporations. As one thing helps the other, a very noticeable increase in the demand for suitable machinery has been the consequence.

Development of Machinery

This demand synchronised with rapid technical development. Now, after careful and expensive investigations and exact research work, it seems that this formerly rapid and progressive development has come to a standstill, because further considerable development appeared to lack promise.

Unfortunately, the development of the corresponding machinery by the interested works took very distinct routes. The method for the industrial utilisation of carcasses, fish and fish offal—*i.e.*, for the industrial production of fish meals, technical fish oils and fats—consists of three different operations: digestion, dehydration and, finally, the more or less perfect separation of the fats and oils. None of the known methods can eliminate this threefold process quite independently of whether the machinery extracts the fatty substances before or after the drying. The precise order of the three operations determines the type of apparatus and plants to be employed.

Three Arrangements

If we assume that each individual operation requires an individual set of apparatus, ignoring, of course, mere auxiliary machines, we arrive at the following three arrangements:

1.	2.	3.
Digester.	Digester.	Oil Separator.
Dryer.	Oil Separator.	Cutter.
Separator.	Dryer.	Dryer.

To-day an astonishing emphasis is laid on these three distinct arrangements by advertisers and salesmen. It is the object of the following investigation to elucidate the subject by means of a critical and unbiassed analysis as well as a comparison of the existing systems.

As the foregoing grouping shows, only the dryer is common to the three methods. Setting aside unessential details of construction, the digester consists generally of a direct or indirect steam-heated boiler, usually provided with very robust agitating mechanism.

Different, however, are the technical details of dehydration and oil extraction.

Oil Extraction

The separation or extraction of the valuable fatty substance is carried out either with the aid of hydraulic presses or by means of centrifugals, in the latter case as an operation subsequent to the previous handling of the raw material in the digester. The partisans of the extraction of oil by means of presses plead, above all, the simplicity of the process.

Extraction by Hydraulic Presses

The digested and boiled raw material is immediately dried in a hermetically sealed dryer equipped with an agitating mechanism and without any previous extraction of the fat. In fact, the digester is converted into a dryer after a certain period of boiling (the time of which depends always on the quality of the raw material) by the simple opening of the valve and connecting the digester with the wet air pump; and any refilling or tedious conveying into another apparatus or any interruption of the flow of operation is avoided. This is undoubtedly a considerable advantage.

The substance having been dried, the extraction of the fish oil is effected. This is done by filling the dried material into hydraulic presses, which are equipped with cloth, so as to expel the oil by mechanical pressure. The disadvantage in this case is the necessity for filling the raw material in the presses in the open; the development of malodorous gases is thereby unavoidable. But

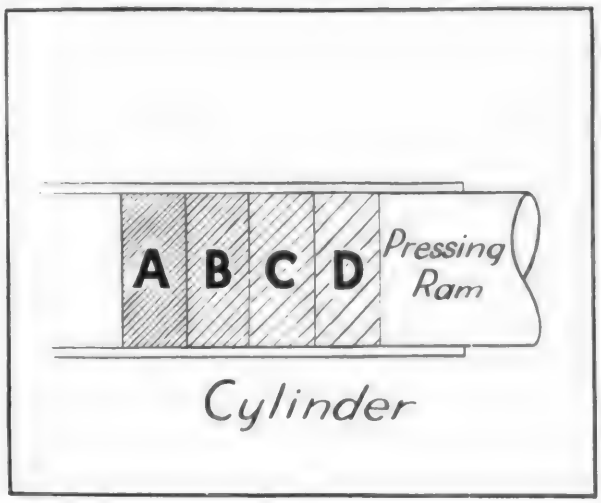


Fig. 1.

even neglecting this fact, the extraction of the oil by a mere mechanical pressure cannot be satisfactory.

Supposing that meat fibres and oil particles be closely associated—*i.e.*, we have a thorough and homogeneous mixture of the oil and meat to be separated—then the oil must be separated from the meat fibres by a mechanical pressure and, especially if it is in the inner zones of the cake to be pressed, must be driven by the gradually increased pressure through the meat fibre which becomes, by the influence of this pressure, harder and harder.

According to experiments made with other materials, such as soya beans, it is impossible to achieve a satisfactory extraction. Towards the end of the pressing operation, the outer zones of the mixture subjected to pressure will be the first to give up the fat, whereas with the increasing distance from the outer zones the percentage of oil becomes higher and higher and the conditions shown in Fig. 1 are produced.

Zone A represents the densest concentration of the meat fibres, zone B is less concentrated, etc. This means that the outer zones have already given up the oil. Not so zone B, even less zones C and D. Now, supposing the pressure be increased again continually, the dense structure of the de-oiled zone A becomes even denser, the fine canals resulting from the previous expulsion of oil disappear—*i.e.*, the intensity of the passage of oil particles decreases in the ratio of the increased pressure, until finally the outer de-oiled layer acts as an impermeable wall, preventing the inner fat particles from finding their way through the compressed meat fibre. This is the moment when apparently no oil is contained in the compact substance, but actually the oil concentrated in the inner zones, which cannot reduce its values under the pressure, is pressed into the cells of the meat fibre. Therefore the extraction of the oil is a very inefficient one.

The objection could be made that the aforesaid is based on indemonstrable theoretical considerations, but practical experience amply confirms the theory. The pressed mass still contains a considerable quantity of oil, which increases steadily in percentage as the inner zones are reached.

Purity of Oil

Due to the force by which the oil is pressed through the cloths of the presses, it inevitably carries with it quantities of fine meat fibre. Not only this, but the material entering the presses contains a percentage of water associated with colloids in the form of a highly concentrated emulsion, which is difficult to separate. During the pressing operation, this emulsion is driven through the cloth and becomes mixed with the oil.

The presence of this foreign matter reduces the stability of the oil and renders it liable to oxidation. To obtain a perfectly dry oil would involve complete dehydration in the dryer at the cost of overheating and burning.

Hydraulic Pressing Method Summarised

It will be seen that the pressing method has its advantages and disadvantages, the latter outweighing the former. The principal disadvantages are (1) deficient extraction of the oil, (2) imperfect dehydration, (3) the impossibility of using hermetically sealed plant.

Oil Separation in Centrifugals

Passing on to the other method of oil separation, by centrifugals, the method is as follows: The previously boiled pasty material enters the drum after having opened a simple shut-off valve of the connecting pipe of the centrifugal, without coming in contact with the open air.

As the centrifugal runs at full speed during its feeding, the paste (which consists of oil, glue-water and meat fibre) entering in that moment is instantly accelerated. This very abrupt acceleration results in the formation of whirls and a loosening of the structure of the material, existing agglomerations being immediately destroyed (see Fig. 2).

What happens may roughly be described as follows: On being fed into the centrifugal, the mass is more or less homogeneous, but at the end of the acceleration an ever-increasing separation of oil, water and fibre takes place according to the specific gravity of each.* The state of

* Specific gravity of the oil, 0·82; of the glue-water, 1·08; of the meat fibre, 1·25.

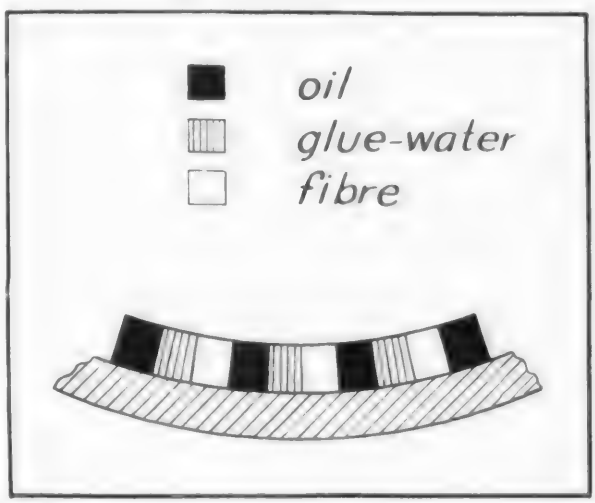


Fig. 2.

things in the centrifugal at that moment is that next to the walls of the drum the heavy fibre has settled, then come the glue-water, and finally the light fish oil. That the separation is a very exact one is shown by Fig. 3.

Let us now examine the sinking velocity of the different substances. After having taken into consideration the well-known fact that this velocity is nearly equal to VC (C being the centrifugal force), we arrive at the formula $C = \frac{W \cdot V^2}{g \cdot r}$ for the calculation of the centrifugal force. In the present case, all the three different substances are subject to the same conditions because they are all contained at the same time in the centrifugal.

After having separated, the distance of the three different layers from the centre of the centrifugal—*i.e.*, of the fibre, of the glue-water and of the oil—is, of course, slightly different, but for practical purposes this may be neglected, as the differences between r_1, r_2, r_3 are very small compared with the diameter of the centrifugal drum, therefore $r_{oil} = r_{glue} = r_{fibre}$.

$$v_{oil} = v_{glue} = v_{fibre}, \; g = \text{constant}.$$

Consequently "C" is only a function of "W", as "W" varies in accordance with the different specific gravities. therefore as its centrifugal energy "C" is highest, and hence also its sinking velocity "S" equals VC.

The meat fibre settles at the outer rim of the drum first, then the glue-water, and lastly the oil. It is an important advantage that the separation does not take place at the same time but consecutively, the separation time being proportional to the individual specific gravities, thus, 1·25 : 1·08 : 0·82.

This very important fact helps to avoid an instantaneous explosion-like separation, which might possibly favour injurious substance ruptures or mixtures. The existence, between the fibre and oil, of the glue-water layer, which prevents the fat from getting into contact with the meat fibre, is a great advantage, both valuable substances being separated by an efficient isolating layer. There still remains a very important refining process.

The consideration of a section (Fig. 4) of the centrifugal material will reveal that there still exist oil particles in the layers "M" and "G". The meat fibre (M), settling on the wall of the drum, is subject to the centrifugal pressure:

$$P_m = \frac{W_m \cdot V_m^2}{g \cdot r_m} \quad (I)$$

In the above formula P = pressure, W_m = specific gravity of meat fibre, V_m = velocity of meat fibre, r_m = radius of meat fibre layer. On the oil particles still contained in the meat fibre zone is exerted the pressure

$$P_o = \frac{W_o \cdot V_o^2}{g \cdot r_m} \quad (II)$$

In this case, the velocity "V", radius "r", and finally "g" are equal to those mentioned in formula (I), but W_o is different. As W_o is considerably smaller than W_m, P_o is also smaller than P_m, consequently the oil particles W_o are pressed outwards with less energy than the surrounding meat particles W_m. This difference of pressure, which is rather considerable on account of the difference

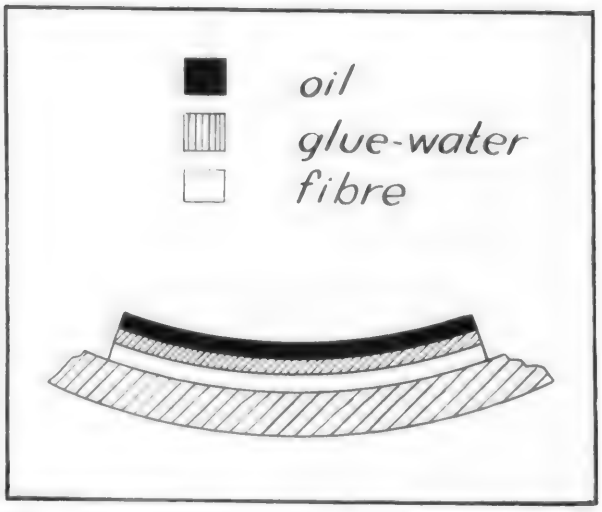


Fig. 3.

of the specific gravity—*i.e.*, 1·25 – 0·82 = 0·43—provokes a strong buoyancy of the oil particles towards the centre of the centrifugal drum. The oil particles leave the layer "M" and enter the next glue-water layer "G". At the moment of entering it is immediately surrounded by numerous particles of glue-water subject to the centrifugal force:

$$P_g = \frac{W_g \cdot V_g^2}{g \cdot r_g}$$

In this layer of glue-water the pressure exerted on the particles of oil amounts to:

$$P_o = \frac{W_o \cdot V_g^2}{g \cdot r_g}$$

In the beginning, the velocity of the particles of oil is greater than V_g, but it is immediately reduced on account of the brake-like effect of the glue-water layer on V_g. As all other factors are equal, but W_o smaller than W_g, again P_o smaller than P_g—*i.e.*, the above-mentioned buoyancy still acts on the particles of oil. Under this influence the oil particle leaves the layer "G" and finally enters the layer "O", where it comes to rest.

The separation has been achieved without drastic external operations, but only through the application of unassailable physical laws which ensure the accuracy of the separation. A possible objection is that suddenly detached particles of oil might carry with them finely divided meat fibre from the layer "M". This might be so if there did not exist the layer "G". If mixed oil and meat fibre left the layer "M", both substances would have the same initial velocity but not the same mass. Therefore they would strike with different force upon the layer "G" and are there separated. The remaining particles of oil, on account of their buoyancy, pass through the glue-water layer and the meat fibre loses its initial impulse in the lighter liquid and its higher centrifugal energy presses it backwards towards the layer "M". It will be seen that the intermediate layer "G" acts as an ideal filter, washing and separating the finest particles of oil and meat fibre.

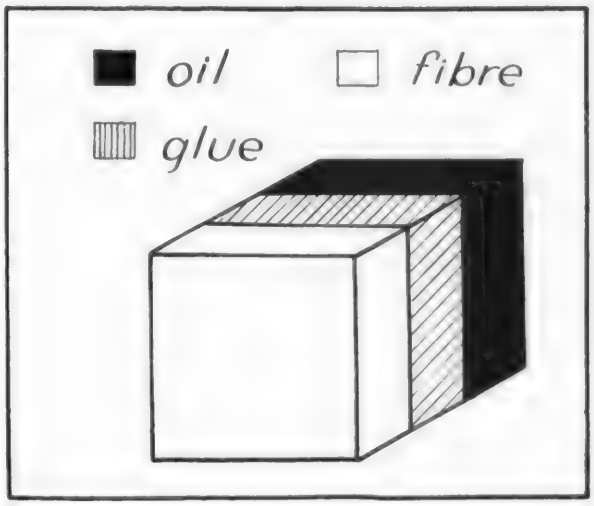


Fig. 4.

Centrifugal separation is an efficient mode of oil separation, which is achieved merely by the intensification of a natural settling process.

Dehydration of Fish Meal

Different methods exist for the dehydration of the material used in the manufacture of fish meal. The differences are based more upon commercial than technical considerations.

It is well known that in rendering plants, vacuum shovel dryers are very popular. However, this type of dryer has been superseded in most modern and progressive industries, fish-rendering plants being the exception. The reason for this is that, for smaller outputs, the digester can be worked at the same time as the drying unit.

This undoubtedly effects considerable reduction in price, but involves the sacrifice of technical principles to commercial advantages. Here arises the question of quality, which surely should be the ultimate aim. In order to furnish cheap fish-rendering plants, it is sometimes recommended to dehydrate the boiled raw material together with the oil before it is extracted, in the same digester. The fat or oil is then extracted with the aid of hydraulic or mechanical presses, as above. It is undeniable that the lubricating effect of the described oil may lead to a reduction in the consumption of energy, as the inner agitating mechanism finds less resistance. Nevertheless, it would be difficult to find full justification for using valuable oil for a lubricating medium.

During the lengthy drying process the oil is continually exposed to temperatures higher than 100°, and this overheating must adversely affect the final quality. This method may be justly described as nothing but the roasting of the meat in its own fat, which is not the rôle of a fish-rendering plant. Furthermore, this roasting must considerably reduce the digestibility of the proteins. Their utilisation in the animal alimentary canal will also diminish. The lengthy roasting results in the penetration of the oil into the cellular structure of the meat fibre, rendering its separation almost impossible.

The fact that this dryer is equipped with a vacuum pump does not alter the situation very much, because even if the point at which the water begins to evaporate be far below the normal boiling point, it does not mean that higher temperatures inside the dryer are avoided. The steam-heated surface of the dryer which is in continual contact with the raw material favours a raising of the temperature of the raw material far above the actual boiling point at the reduced pressure. If the meat pastes were already de-greased, the evaporation would be more general and the reduction of temperature of boiling more considerable. Under these conditions the employment of vacuum shovel dryers, especially in the case of the smaller plants, *might* be justifiable. However, in the shovel dryer the formation of an oil-and-water emulsion is favoured, which, as with all emulsions, renders the evaporation of the water more difficult.

In view of these considerations, it is not surprising to note the increasing popularity of cylinder dryers for the production of high-grade fish meals.

Cylinder Dryers

Cylinder dryers evaporate water by direct contact with steam-heated metallic surfaces, not as in shovel dryers in thick layers, but in very fine endless ribbons, so that the dehydration is done in a few seconds. The treatment of the de-oiled paste-like thin layer means an enormous increase in the surface of the material to be dehydrated, and therefore, also in the same ratio, increased possibility of heat transmission.

Drying is effected by exposing the thin layer of paste to the influence of heat for 8 to 10 seconds. An objection is that by the close contact with the steam-heated surfaces and in view of the thin layer of the substance, overheating would be unavoidable. If the surface of the drying cylinder is perfectly smooth, and this is easily achieved, the scraping knife completely removes, after each revolution of the cylinder, the dry thin layer, and it is absolutely impossible for particles of dried meat to make more than one revolution before being scraped off.

Important here is the protecting effect of Leydenfrost's Phenomenon, which refers to the instantaneous formation of a protecting layer of steam between the heated cylinder and the wet material which prevents the heat from being transmitted too violently. Moreover, this sudden evaporation at the moment of contact between cylinder surface and wet material absorbs so much heat that a dangerous increase in temperature is rendered impossible, so that the material cannot be burnt.

On the other hand, bacteriological or other decompositions cannot take place, the drying time of a few seconds being too short for any reaction. A further advantage is that the dried meal is obtained in the form of regular flakes of a bright yellowish colour, and the fish meal is extraordinarily digestible.

Comparing twin-cylinder dryers with shovel apparatus, the advantage of eliminating expensive and delicate vacuum equipment must be added to those already enumerated, and there seems reason to anticipate that a plant equipped with centrifugals and twin-cylinder dryers, especially when applied to larger scale working, will be increasingly adopted.

FOOD PSYCHOLOGY

H. DEUTSCH-RENNER

MOST SCIENTIFIC observations and experiences, when stated, require to be modified by the phrase "as a rule". This limitation is of no great importance in the practice of food production which is adapted to the requirements of the average consumer whose tastes must be considered.

Only in the home can an individual note be struck in food preparation; the food industry is bound to turn out standard articles. Industry can cater for many tastes, but only in cases where mass production is feasible—that is, when rather smaller averages emerge in the public taste. What is the "rule", therefore, in science forms a satisfactory basis for industrial production.

To state what is the "rule" and what are the "exceptions" in inclinations or tastes of the consumers, is the chief task of psychology in food production. This task is difficult, as even the "rule" cannot be found with certainty on a fixed point of properties of a product, but within a certain range. It always remains doubtful on which point the maximum degree of pleasantness is reached for the average consumer one has in mind.

This general statement has its validity also for those properties of foodstuffs which are characterised by colours and flavours.

Calories and Vitamins

The development of civilisation has not influenced those customs and habits peculiar to man as a consumer for thousands of years and which are even evident in the animal kingdom. Whoever buys foodstuffs with the object of eating them in the family circle or whoever is served with food does not send a sample beforehand to the food chemist for his approval.

Now, as ever, the people of to-day rely entirely upon their eye and nose in appraising foodstuffs. A person thereby utilises the experience acquired in his own lifetime with eye and nose as well as much that is probably inherited from long-past ages.

Perhaps the sole difference between these and former times is that in the modern food retail trade, a third sense formerly used extensively, the sense of touch, has been largely eliminated by modern hygiene, at any rate in the case of finished products requiring no further preparation. The functions of eye and nose do not appear to be replaceable by our knowledge of calories and vitamins except in those cases when the individual goes on a medicinal diet.

It is generally known that pleasantness to eye and nose increases the consumption of a particular foodstuff; therefore the *quantity* of consumed calories and vitamins depends on the senses.

The power of the senses indeed goes still further in determining whether or not the calories will be completely taken up by the body according to the degree of palatability of the food. The mere figures of calorific value therefore only possess relative validity. It is a fact that bleached fruits, bread with age-wrinkles and grey chocolate are unappetising even when their calories and vitamins are intact.

The practical task of the physiology of the senses (especially the visual and olfactory ones), as well as of the psychology of the senses, is to detect not only the laws of marked differences, but also the subtle distinctions which to-day are of paramount importance for the commercial success of a product.

Brightness and Colours

The ability of the eye to receive visual sensations is scientifically grouped under two sharply defined headings which only imperfectly coincide with everyday practice. Without clarity on this point the food industry is working in the dark and will make slow progress.

Scientifically a fundamental distinction is drawn between colourless sensations ranging from white through grey to black and coloured sensations as represented by the solar spectrum. The various stages of colourlessness are described as grades of brightness.

The eye is very sensitive to changes in the latter and can appreciate a difference of 1/100 to 1/150 of any given degree of brightness. In judging food colours no strict distinction between effects of brightness and of real colours has been made hitherto. It may prove to be valuable to enter in this rather difficult matter more fully.

Grade of Colour or Saturation

This property of colours is of exceptional practical importance for foodstuffs. By colour grade or saturation is understood the property of colour perceptibility existing in any desired transitions to colourlessness. Each colour tone is linked by degrees to the scale of colourlessness.

The latter is represented by white, the various greys and ultimately by black.

This point is best clarified by using the term "saturation", which is borrowed from the usual method of producing these transitions. By changing the quantitative ratio of the colour to the colourless solvent, different degrees of saturation are attained. If the "colourless" solvent is white, the solution possesses maximum brightness; if grey, the brightness is reduced and, if black, it falls to a minimum. But the colour tone remains the same to the eye in each type of saturation.

In this sense flour can be regarded as a solution of the intense dyestuff, carotene, in a colourless medium producing the impression of white or various shades of grey. Following what has been said, the colour effect is not only dependent upon the ratio of dyestuff to colourless medium, as is commonly believed, but is also determined by the brightness of the mass. In a greyer flour, therefore, a given quantity of carotene is less perceptible than in a white flour. The laws of brightness also come into play when it is observed that smoothly spread flours are better comparable in respect of colour effect than loosely poured flours, for brightness depends not only upon the ability of a substance to absorb or reflect light but also upon the illumination.

The shadow-formation upon a loosely poured heap is equivalent in visual effect to a partially poor illumination. But as this shadow-formation is irregular (stronger with one heap and weaker with another) uniformity is attained by smooth spreading. On immersing such samples in water, the effect of the tone colour is enhanced for reasons hitherto unknown, so that the colour difference as well as the degree of brightness is accentuated. As to the comparison of colour effects of foodstuffs in general, it may be said that an exact comparison is only possible when the shadow effects upon the brightness can be eliminated, including the natural shadows as produced, for example, by the simple existence of pores in bread. The combined effects of the dilutions of genuine colours and genuine shadowless brightness were set down many years ago in a system of measurement in which colour tone and brightness are expressed by figures and letters.

It is astonishing that of all branches of the food industry only that of chocolate production evinces any disposition towards applying this system in practice, propagated in this branch by the well-known expert, Dr. Fincke of Cologne. Compilation of such a scale for the tones occurring in the colour range of flour and bakery goods would dispense with the necessity for direct matching of two samples so that matches could be decided upon verbally or by letter or telegram. Equally astonishing is the lack of realisation of the errors inevitably arising when it is attempted to base a decision upon photographic illustrations. Apart from the obvious impossibility of reproducing the natural colours, photographs also show the brightness in a false form because the red colour tones have a darkening effect. None of the innumerable photographs of bread crusts, biscuits and bread crumbs have shown up the tone brightness, and yet photographs are in constant use for comparison.

To make the distinction clear it is merely necessary to colour a cross-section of a bread sample by pressing it on a stamp pad and then make an imprint of the pores on white paper. Such a picture reveals scarcely any difference between the pores of crust and crumb, whereas on a photograph the pores of the crust are hardly visible owing to the blotting-out of the red colour tones. The system of measurement of colour tones and brightness is commended to the attention of the entire food industry.

Gloss and Smoothness

Gloss and smoothness are powerful sales-attracting factors. They please the public in general. Mankind has developed through immense periods of time before being able, as now, to produce smoothly surfaced articles —not only foods, but everyday goods, from cutlery to furniture. In general, therefore, smooth surfaces are expressions of an advanced civilisation. Smoothness and gloss also indicate the freshness of products even if it does happen that roughness and dullness are demanded as a reminder of olden times.

In the particular case of foodstuffs, the consumer demands freshness, as revealed by gloss and smoothness, because it is bound up with the maximum effect of the flavours, while the smoothness is linked up with ideas of hygiene since dust cannot adhere so well to smooth surfaces. Where roughness is desired it is also bound up with ideas about definite flavours, which, in many bakery goods, are only developed by roughness. Nor is the sense of touch in the mouth a negligible factor, for here again smoothness is pleasing, while roughness is only pleasurable for a change.

The World of Flavours

The world of flavours may be considered from the mathematical aspect. Chemical analysis reveals the presence in many volatile oils of dozens of constituents each of which possesses its specific odour. The effect of a single essential oil upon the olfactory sense is thus extremely complicated.

As far as our present knowledge goes, it is merely a caprice of nature that these odorous substances occur in a combination that can be separated by mechanical or chemical methods. Many of these odorous bodies do not enter into such combinations or have not been detected in them. Many essential oils are present in foods, brought in partly by the raw materials, partly as extracts from other substances, very easily detectable by the nose, but seldom extractable.

It can, therefore, be taken for granted that a single foodstuff contains hundreds of odorous chemical substances which must be present in certain definite proportions, as in perfumes. Any change in their equilibrium will be detected by the nose. Bearing in mind that we are almost completely in the dark as to the nature of most of these ingredients and that quantities smaller than can be demonstrated by chemical analysis can be detected by smell, it is easily understood why the chemistry of foodstuffs is progressing very slowly in this line. Chemical science has prepared over 60,000 compounds each with a different smell, and yet this number is grossly inadequate for our purpose.

Measurement of Flavour

Extreme confusion has hitherto prevailed in practice on the question of the possibility of measuring flavour. Let us first consider a general observation on the nature of quality and intensity in connection with measurability. Even in the case of cloth the quality can be judged only by properties of toughness and pliability of the threads which may be desirable or undesirable.

Linear measurements are, in the case of cloth, the only dimensions and a similar limitation confronts us in attempting to measure flavours. Quality is recognised by the properties of the aromas detected by the nose, but these cannot be measured; they cannot even be easily brought into a system and described as fruity, floral, putrid, etc. The present position of the measurability of intensities, which can be compared with the dimensions of cloth, is discussed next.

Practical Intensity Measurement

No one believes that he can measure flavour intensities in everyday life, but this is actually done both by producers and consumers who apply the so-called psychical measuring method. This does not involve the use of a yardstick, but is rather based upon three factors: A given sensation is equal to, smaller than or greater than another. We are constantly applying this psychical comparison which is very accurate of its type, but the results are not representable by figures and cannot, therefore, be recorded. Since we are accustomed to regard only those processes as measurements which give numerical results, we are not at all conscious of the fact that the sphere of measurement comprising "equal", "smaller" and "greater" is really connected with measurable data. A comparison can be made with the state of affairs when linear dimensions were reckoned according to the length of an individual's foot. The results in those days possessed good utility—but yardsticks are still better.

The Yardstick of Flavours

In connection with the question as to whether vacuum cooling of hot bread on leaving the ovens harms the flavour or not, an American expert asserted that naturally no yardstick for flavours existed. This is a serious and widespread error. Ever since chemistry became a science attempts have been made to measure the odorous strength of many chemical compounds.

The method generally applied consisted in diluting an odorous substance with a solid or liquid diluent to the limit of odour-detection. The required figure was the ratio of odorous substance to solvent. The author knows of only two cases in the food industry where the odour chemist has applied this method. The first is the dilution of the bouquet of alcoholic drinks, especially brandy, and the other in the dilution of the aromas of natural chocolate. But the chief studies in this department were made not by chemists themselves but by sense-physiologists. The latter have introduced system into scientific conceptions.

What chemists measure when they ascertain the minimum proportion of a perfume in diluted form is nothing more than the value of simple thresholds of recognition for a given substance. It has also been established that these thresholds are not the only data supplied by numerical measurements of the intensity of odours, but that the thresholds of differences can also be measured —*i.e.*, the detection of differences in odour intensity of one and the same odorous substance.

A large number of possibilities of measuring the simple thresholds have come to light apart from the exhaustive dilution method of the chemist. These methods can be grouped into:

1. Those in which the quantity of perfume contained in unit volume of air so as to yield a noticeable smell is measured. A noteworthy result has emerged in applying this method; it appears that some odours are so powerful that less than one molecule can be detected. The theory that perfumes exercise an odorous effect by virtue of their quantity and not in consequence of certain other qualities is thus shaken.

2. Methods for estimating the concentration of perfume solutions at which an adjacent air current takes up just enough perfume. These methods are chiefly applied, as mentioned above, by chemists.

3. Methods in which the distance of the nose from the seat of the odour is measured. This method readily occurs to anybody who begins to consider how to measure flavour intensity, but has been proved to be untrustworthy.

4. Methods which measure the size of the odorous surfaces from which an adjacent air current just carries with it a noticeable quantity. This method has acquired the greatest significance in the physiology of the senses, but has nevertheless remained unknown in the laboratories of the food industry. It is explained below as far as possible.

The Best Yardstick of Flavour

In the nineties of last century the Dutch physiologist, Zwaardemaker, had begun to construct a smelling apparatus to measure the odour-intensity of different odorous substances and the efficiency of different noses on the basis of the exposed surfaces. Zwaardemaker steadily improved the apparatus in the course of decades.

A porous hollow cylinder is dipped in a solution of the substance under test and then transferred to a vessel in which it is internally and externally covered with two separate metal cylinders. Through the empty space an air stream was passed leading directly to the nose. At this stage the odorous effect was zero. But the cylinder charged with odorous substance was then gradually pushed forward by a mechanical device so that it gradually became uncovered. At a certain position of the odour cylinder the odour becomes perceptible for the first time, and at this point the experiment is ended.

The linear displacement is simply measured, the figure representing the odorous power of each substance, the simple threshold value in inches. The same process can be applied to the estimation of the threshold of differences by using two such apparatuses side by side, the cylinders of which are charged with different concentrations of the same substance. Advantage is taken of the duality of the sensual organs by attaching each nostril

(*Continued on page* 66)

THE SOYA BEAN

ITS IMPORTANCE AS A FOOD

SPECIALLY CONTRIBUTED

The Soya Plant

SOYA FOOD products are important because of food defence measures and also because plans are afoot to interest capital in the big-scale cultivation within the Empire of this oil-seed legume. Cultivation in England should be especially welcomed because soya, being a nodular legume, actually enriches the soil when nodular bacilli are present, while flax, the only other oil seed available to British cultivation, is particularly hard on the land.

In a commercial sense, there appears to be no practical alternative to soya as a source of home-produced edible oil. Thus it may be useful to consider evidence, resulting in the main from enquiries of firms who have to do with edible oils, such as are used in margarine, lard substitutes and the like, or meal used in food industries.

A reduction in the amount of soya-bean oil used in this country in the manufacture of lard substitutes has resulted from comparative price and because expert opinion considers that other available vegetable oils are, in most respects, equal to soya for the purpose. A director of a large fat refinery revealed that for many years deodorised soya-bean oil was used as an ingredient in manufacture of edible lard compounds. The practice has been discontinued lately, to a great extent, owing to the relatively high price of soya oil compared with other suitable and readily available edible vegetable oils. He points out also that practically the whole of the supply used in this country comes from Manchuria (this is significant) and is therefore subject to import tariff, whereas other vegetable oils come mostly from countries within the British Empire and "thus enjoy a preference". Moreover, there appears to be no particular feature about soya oil which makes its use imperative in the manufacture of lard substitutes. Ground-nut oil and cotton-seed oil have equal nutritive values.

A British firm engaged in the preparation of soya products for the food industries confirm what is indicated by U.S.A. practice, that there is a consistent demand for soya flour for bakeries and as an ingredient in the manufacture of ice-cream raw materials, custard powders, and similar preparations.

English Soya Bean

Professor Sir Rowland Biffen, in his recent report to the Royal Agricultural Society on soya-bean cultivation in England, concludes from the evidence obtainable that soya as a field crop has, so far, failed to reach the economic stage. Since this is the most recent authoritative report available on the subject it will be profitable to examine briefly its findings.

Sir Rowland states that as a result of inoculation, certain crops of soya were notable for nodular roots and therewith extra vigour in the plants. This increase, however, was accompanied by a delayed ripening period. One crop under observation, that giving the best yield (No. 1 Manitoba Brown), produced seed calculated to be at the rate of 10 cwt. per acre on inoculated ground. Other varieties have produced "appreciable" crops of 3 and 4 cwt. respectively. As soya beans can be purchased at around £7 a ton, Sir Rowland considers that crops giving yields of this order are not worth growing in Britain. He suggests that, in respect to available figures, crops of around 30 cwt. per acre would be necessary to provide reasonable economic return, and a variety will have to be produced to suit this climate, ripening in time for drying after harvesting.

In the course of a reply, dated August, 1938, Fordson Estates, Ltd., state that they have grown soya for the past five years with varying success. These beans have, in the main, been sold as acclimatised seed for trials and experiments in other parts of this country. Imported seed cannot be brought to maturity in this country, and the acclimatised type, being as yet scarce, is expensive. From the ordinary farming viewpoint, therefore, the crop is not an economic proposition.

If, in the course of time, soya becomes a major rotation crop, and beans are sold commercially to crushing mills, then the British bean would have to compete with the foreign product. The City of Birmingham, Parks Department, in a communication, also dated August, 1938, say, "We have harvested a fair crop of beans at Quinton Nurseries this year". The department, however, are not in a position to furnish cogent comparative figures. Beans on a big field scale are, according to the Soya Bean Cultivation and By-products, Ltd., being successfully grown at their estates in Oxfordshire.

Facts about Soya Cultivation

Reasonably, then, it may be presumed that the facts regarding soya in England are to be thus set down. Like certain other field crops now of major importance, such as potatoes, soya is not indigenous to British soil. Farmers, at present, are not entitled to regard soya as an oil-seed crop likely to provide economic return. Initial crops, even if successful, will prove expensive, partly because the field soil must be inoculated: a "field" is not permanently inoculated with soya nodule bacteria until after the second crop. The cost of "acclimatised" seed will be, at current quotations, around £4 10s. an acre. There appear to be heavy demands for this seed.

On the other hand, on well-worked soil the plant actually enriches the ground as far as nitrogenous factors are concerned. Soya is less susceptible to frost than, for example, maize, and is practically free from disease or attacks from above-ground insects. It requires, however, a fairly light, "clean" and non-acid soil which must be well worked prior to sowing. Rabbits are particularly destructive to young soya plants, and, according to evidence, it will be practically impossible to secure efficient crop returns where these rodents are plentiful.

Again, about one-half of the now enormous soya crop in U.S.A. is utilised as "feed". As hay it is considered equal to alfalfa, providing the haulm is cut soon after the bean pods appear and before the texture of the plant becomes fibrous.

Soya Hay

According to the analysis table contained in Henry and Morrison's *Feeds and Feeding*, soya hay ranks highest, with alfalfa next in the range of "feeds". The results are:

	Protein *Per Cent.*	*Carbohydrates* *Per Cent.*	*Fat* *Per Cent.*	*Total* *Per Cent.*
Soya ..	11·7	39·2	1·2	53·6
Alfalfa ..	10·6	39·0	0·9	51·6

A valuable method of improving soil is by using soya as a feeding-off crop for sheep or hogs, as the vine is high in protein value. By this means increased yield in rotation or autumn-sown crops is secured.

Protein cattle foods are comparatively expensive; soya hay in conjunction with other feed enables a more or less balanced ration to be provided for dairy and beef cattle and for raising young stock. The protein value of the vine diminishes as the plant attains maturity: thus, when seeds near the ripening stage the soya vine has sacrificed nutritive value to the seed pods; at this stage also it becomes tougher and its leaves fall.

The storage of soya in Manchuria.

Growing Soya for Seed

Three-quarters of a million acres in U.S.A. are annually under soya for seed. The difficulties of selection according to locality are recognised, and of the fifty species available the dwarf, quicker-maturing varieties are grown mostly in the north and the taller varieties in the cotton regions and in south-west territory. Much depends both for seeding and forage crops on efficient soil inoculation.

Notable, too, is that the U.S.A. Department of Agriculture supplies farmers with active and pure cultures for inoculating seed before sowing; thus more or less permanently establishing the nodule bacteria in acreages where soya has been grown.

Refining the Oil

Soya oil is refined, usually in five stages, and the biggest problem in connection with food products is the liability for soya oil to "revert" in flavour. This reversion is in no sense rancidity, but appears to be the effect of a glyceride which, during storage, is apt to cause the refined oil to take on a particular flavour—a reversion, in fact, to the original "bean" flavour. Certain types of soya oil are less susceptible to this reversion, which is attributed to the fact that 90 per cent. of the fatty acids forming a low percentage are unsaturated, and thus far a factor against soya oil and in favour of cotton-seed oil. The oil apparently contains an inhibitor against rancidity and is in this respect particularly stable. The oil can be almost water white, but the darker types are probably more useful for margarine.

Views from U.S.A.

The U.S.A. Department of Agriculture presents some highly interesting information on the uses of soya in up-to-date food processing. Regarding bread, an addition of about 25 per cent. soya flour produces a highly nutritious type of loaf with superior resistance against staling. This bread possesses what is described as a "rich nut-like flavour". Bread made with the addition of soya flour is now increasing in public favour, since it is both palatable and of high food value. Soya meal contains, according to one U.S.A. authority, three times as much fat as oatmeal and 40 per cent. of protein against an average of 15 per cent.

Soya food preparations are highly assimilable; the flour is characterised by a low sugar content, whilst starch is absent, and thus is valuable for diabetic foods. It is yellow in appearance, has a sweet and nutty flavour, and is thus utilised only after extraction of the oil. The so-called soya milk is used in preparing bread and cakes. This emulsion is prepared by soaking the yellow variety of soya beans for a few hours in water. They are then crushed into a fine texture mash. This is boiled for thirty minutes in the proportion of three parts water to one of mash. An emulsion results which is similar both in appearance and properties to animal milk.

Soya Milk for Confectionery

Besides bread and cakes, soya milk can be used successfully in manufacture of milk chocolate, custards, and the like. If magnesium or calcium salts, rennet or lactic acid is added to this milk when slightly heated, protein is precipitated. This is "bean curd", and is the basis of fermented, smoked, or dried cheeses; a variety of highly nutritious foods may be elaborated from this base.

In America canned bean curd has been marketed, but the report has it that no success followed the experiment. Big-scale manufacturing, somewhat on the foregoing lines, is in progress in Canada, where a manufacturer supplies soya milk flocculates for infant foods and similar products.

Appreciable proportions of refined soya flour may successfully be incorporated into various food preparations, such as in bread, sausages, cocoa preparations, chocolate, soup cubes, ice-cream, blanc-manges, etc. Advantages with bread are that the loaf keeps in better condition, it produces a shortening effect on dough and a notably improved texture in the bread. Vitamins A, B, C and lecithin are present, the dough is easier to handle, and for certain types of bread milk content may be decreased. Lecithin, however, is usually extracted to a great extent with the oil. It is claimed also that the effect of lecithin here is to prevent "bloom" in chocolate.

The Port of London Authority state that around 70 per cent. of the annual soya-bean tonnage imported into London, roughly 21,500 tons, is utilised by one big industrial concern, the remainder being largely processed for use in British food industries. Soya beans, according to this authority, are imported into the United Kingdom from Manchuria and, to a smaller extent, in bulk from U.S.A. via Canada. The American quota averages, according to latest statistics available, about 14·5 per cent. of the total imported. It is perhaps significant that, although during 1935 Manchurian bean imports into London totalled 18,000 tons and in 1933 17,000 tons, during 1934 imports were nil.

Home-Growing of Soya

These facts assume importance in view of the endeavours now on foot to promote acclimatised soya-bean crops on a big scale in England. The U.S.A., for example, started experimental cultivation of soya in 1910, when the Pacific Coast Mill was the first undertaking concerned with oil extraction and soya meal cake production. To-day there are several big plants, either converted from cotton-seed oil or in conjunction with this product, crushing soya beans both in the Middle West and the West. The last figures available—namely, 391,000,000 bushels of oil soya seed sent to the mills in 1935—indicate the importance of this crop as a home product.

The British Soya Bean Growers' Research and Development Society provide certain significant figures. The following particulars are stated to indicate a deplorable position:

"In the year ended March, 1936, we imported 119,695 tons of soya beans, value £801,949, from foreign countries, but none from British; 27,645 cwt. of refined soya-bean oil, value £37,304, from foreign countries and 12 cwt. only of refined soya-bean oil, value £12, from British countries. This totals £1,531,327 from foreign countries and only £12 from British countries."

Clearly then this subject, in view of the facts, is worth consideration. British conditions will doubtless discount some of the evidence favourable to soya exploitation; on the other hand, if a home- or Empire-produced, commercially sound source of some twenty or more raw materials can be successfully established, then a defensive resource of incalculable industrial value should result.

Electrical Control in Sugar Making

THE POSSIBILITY of using the electrical resistance of a sugar solution as a means of controlling the flow of that solution in sugar refineries is being applied in France in an interesting way by the Régulateurs Arca. The purpose of the system is to keep the concentration of sugar juice constant in the vacuum pans used for evaporation of water from the juice. This result is obtained by placing an electrode inside a vacuum pan in such a way that it will be covered by the juice. The current which passes through the electrode is fed to an ohmmeter designed with a sliding contact point. Power to the system is through a small transformer in series with a resistance which permits the current intensity and the voltage to be regulated as desired. The sliding contact point on the ohmmeter is connected with a magnet operated mercury make and break, which in turn controls the operation of an electric motor. As the juice in the vacuum pan becomes thicker, through boiling, the resistance of the solution decreases, and the indicator of the ohmmeter leaves the contact point. This causes the mercury make and break to operate, thus starting up a motor, which opens the valve feeding more juice to the pan. As more juice enters, the concentration is reduced, the resistance rises and the indicator of the ohmmeter returns to the contact point. This opens the mercury make and break, stopping the motor and cutting off the flow of juice. This system, it is claimed, permits very accurate regulation of the concentration of the juice.—*Electrician.*

NEWCOMERS TO THE VITAMIN LITERATURE

Food Health Vitamins, *R. H. A. Plimmer, D.Sc.(Lond.), and Violet Plimmer. 8th Edition. Pp. 233. London. 5s. net.*

The Health of the Nation and Deficiency Diseases, *John Maberly, M.R.C.S.(Eng.), L.R.C.P.(Lond.). Pp. xi+118. London. 5s. net.*

A.B.C. of the Vitamins; *A Survey in Charts, Jennie Gregory, M.S. Pp. xii+94. London. 13s. 6d. net.*

Nutrition and Diet Therapy, *Fairfax T. Proudfit. 7th Edition. New York. Pp. 923.*

IN THE matter of vitamins investigation follows investigation with veritably bewildering rapidity. Every issue of the journals contains one or more papers which shed another ray of light or light from another angle, upon a still complicated subject.

Books pour out too. Books in their first edition—interlopers among quite a goodly company of old and trusty friends waxing mellow in the status of half a dozen or more editions.

We have travelled a long way from the days of Eijkman (1890-1897), from Funk (1912), and his "vitamine theory"; Hopkins' celebrated paper of the same date, and other persistent and indefatigable investigators of those times.

Three out of the four books before me treat with the vitamins. R. H. A. Plimmer and Violet G. Plimmer's book provides most, if not all, of the information about vitamins necessary for anyone to know except the specialist worker on the subject. Tables there are galore. I find a tendency in modern textbooks, no doubt due to the encyclopædic nature of the information considered necessary to be imparted, to use too many. The prime object of the textbook, especially for the busy practitioner, chemist and the like, is to be a source of facts which may be rapidly referred to. A difficulty with tables is that, in avoiding the Scylla of duplication, the authors may strike on the Charybdis of over-crowding. It is, of course, very difficult satisfactorily to present tables of average compositions of such things as the different meats and normal variations are quite significant enough to throw out dietetic calculations. One rather maddening thing about some tables is that they do not indicate whether the foods are cooked or uncooked, and, if indicated, how the cooking is done, whether by boiling, roasting, grilling, steaming, etc. The representation by table of, say, the solubility of vitamin C is one requiring considerable concentration and, one might suggest, collaboration with the kitchen department.

These remarks do not apply specially to the tables under review, but to tables in general. But on page 57, Table 2, the vitamin C value of vegetables does not indicate whether they are based on the cooked or raw state—one concludes that it is the former as man does not eat raw swedes, turnips, or vegetable marrow.

The book contains a tremendous amount of matter, and under the heading of each vitamin treats clearly and economically the historical aspect; symptoms of deficiency diseases; experimental work; the testing for vitamins; chemical composition and stability. One feature to be noted is the series of diagrammatic representations, starting with a diagram in colour of "a square meal", which shows lists of foods which contain and do not contain the different vitamins. The diagrammatic approach may well appeal to many minds whilst its reaction on others might be unfavourable.

Leave Cereals Alone

Dr. John Maberly's book discusses the etiology, symptoms and treatment of some of the principal deficiency diseases, and stresses the sins of the flour millers and others. He devotes a page and a quarter to the discovery of vitamins. In this chapter he misnames Casimir Funk, and does not differentiate between B_1 and B_2, although he does so in a subsequent chapter. In chapter vii the whole subject of vitamin E is dismissed in ninety words.

Dr. Maberly writes trenchantly about wheat. "For man in his ignorance and greed to deliberately attempt to alter Nature's perfect work and modify the balanced food content of the cereals appears to be the height of folly and foredoomed to produce dire results. Yet this is precisely what he is doing at the present time, not only with that most perfect of the cereals—wheat—but also with rice and maize."

He attributes a good deal of unfitness existing in this country to the eating of white bread. He paints a rather depressing picture when he says that "during a visit to Hunstanton, Norfolk, in the holiday season, when hundreds of excursionists from the neighbouring industrial and farming areas collect and promenade on the sea-front, I was astonished at the preponderance of undersized and poorly developed young men and women; it was quite the exception to see a really well-developed man of good stature among the younger generation. One realised that the typical Englishman is no longer represented by the John Bull of *Punch*, but much more correctly by the little man with spectacles and an umbrella of Strube". And, strangely enough, the expectation of life for that "little man" is very much greater than it was for his bucolic ancestor immortalised by our revered contemporary.

Dr. Maberly cites several cases which have come under his notice, the diagnosis of which was probably beriberi. He also says that in general practice among patients past middle life, disturbances in the rhythm of the heart, palpitation and weakness of the heart muscle are becoming increasingly common without any history of rheumatism or other infection. There can be little doubt, he says, that these cases are merely manifestations of a deficiency of vitamin B_1 in a diet of which white bread is an important basic element.

Again he attacks the millers. ". . . We have spent millions in supplying the inhabitants of our towns with pure water, and lately we have seen the whole machinery of Government set in motion to enquire into the question of some microbes getting into the water of Croydon and killing about forty of the inhabitants. The milkman who skims a little too much cream off our milk or adds a little water, or the butcher who attempts to sell us tainted meat, is promptly fined or imprisoned. Yet the mill-owner who is tearing out the heart of the wheat and selling it as poultry and cattle food, and supplying the rest of the corpse to the public as bread, is allowed to go unscathed."

Cold Storage

Dr. Maberly airily suggests that the objection that a flour containing the germ does not keep sweet for more than six weeks is *easily* (the italics are mine) overcome by cold storage, or, as he has been informed, by reducing its water content. He could hardly have thought about the industrial implications of either of these processes as applied to wheat.

Towards the middle of his book the author abandons diet almost entirely and devotes himself to case histories, drugs and prescriptions, which lie without the scope of this journal. But in view of the almost general prevalence of colds at the present time, colds that "run through" families, offices, and factories, and on the principle of "trying anything once", there may be quoted a prescription for staving off a cold in its early stages. The doctor took 1 drachm of iodised tincture of guaiacol, "with the result that the symptoms disappeared in no time".

Vitamins Charted

I have mentioned the matter of diagrammatic representation. Here is a book by Miss Jennie Gregory, M.S., which is

80 per cent. diagram, or, as she calls it, chart. In a Foreword, Dr. Walter H. Eddy says: "From time immemorial blackboard and chalk have been the tools of the teacher. The eye is a big help in the comprehension of either principles or structures and so recognised by all who try to instruct. Miss Gregory, in this book, has enlisted the visual instruction method to present the story of the vitamin . . . for the layman or scientific student who wishes to quickly grasp the essentials of the story. She has concentrated scientifically accurate data into what can be grasped with a glance."

Miss Gregory herself mentions that "the amount of technical material in the form of articles in scientific periodicals is staggering", which has my heartfelt agreement. She mentions that her book has been written in order to present to the practitioner an orderly picture of vitamins and their functions. She assures us that "some of the charts are very simple and easily read; others require careful study if they are to be completely understood. Pictures and graphs are more easily read than prose, and the result is a clarification that does not sacrifice accuracy and emphasis to long-winded explanation."

This is Miss Gregory's case for pictorial representation of scientific facts, and she has certainly carried her ideas out very thoroughly. Books have differing functions. Some people use them to learn and to memorise facts; others will rely on them for reference where a subject is too complicated for memorisation. Dr. Eddy, from the works quoted above, has in mind the teaching aspect, but whether he means the teaching of the young or adult is not quite clear.

Miss Gregory has not achieved her main object, as she includes a large amount of letterpress in the charts, and thus, in the reviewer's opinion, the work falls between two stools. There is a contents page, a short bibliography and a glossary of terms. For those who like their doses of vitamins applied mentally through visual channels, this book may appeal.

Dietetics in Health and Disease

Fairfax T. Proudfit's book is the final one on my list and is a rather terrifying one from the reviewer's angle—623 pages of close type. Here again is a book which has run through many editions—this is the seventh—the first dating back to 1918. It is a Textbook of Dietetics. The matter included in the previous editions has been "reorganised and rewritten to follow closely the curriculum of the National League of Nursing Education in order that the courses in nutrition and diet therapy may fit into the accepted scheme of nursing education".

This is frankly an educational book. On looking through the vitamin tables we are struck by the various ways the requirements may be expressed. In the various books we have them in "units per gram of food", "the amount of food corresponding to a unit"; "milligrams required per kilo of body weight", and so on. In Fairfax Proudfit's book we get them in "so much per 100 calories". Incidentally the vitamin tables are excellent, as they compress, in readily readable form, the information usually given in two or three tables in many other works.

Nourishment for the Skeleton

The work is divided into four sections and an appendix. The first section deals with "Normal Nutrition". The next section, Laboratory Lessons arising from the first. The approach to the lessons, which mainly concern cookery, is an excellent one, the general principles being set out as well as recipes. The rest of the work concerns diet therapy and outlines special diets for specific diseases.

The pictorial method is again used here. As an example we have the picture of a skeleton accompanied by drawings of a bottle of milk, a loaf of bread, a chunk of cheese, etc., with a large caption, "For bones and teeth, Eat Calcium Foods."

In the appendix figure "Quiz Questions", and there can be no doubt but that the nurse-dietitian, or, indeed, any dietitian, who successfully negotiates the 148 questions, has well and truly "swotted up" the subject!

T. C.-W.

AN ENCYCLOPAEDIA FOR CHEMISTS

AFTER months of preparation, the thirteenth edition of a widely used annual, *Chemical Industries*, 1939, is just off the press.

As in previous years, additions and revisions have been made to the text; this results in a comparison of chemical advances being possible, as well as ensuring that the latest information is available.

Advantage has been taken of the publication of a new set of British Standards, dealing with chemical symbols and abbreviations, to include some of the most important in the volume. General recommendations covering the style of printing chemical symbols have been produced: the British Standards include tables of important physical constants, and mathematical symbols as well as those used for physics, chemistry, heat, thermodynamics and the metric units. These symbols and abbreviations are in daily use by almost every chemist.

Recently, the international atomic weights for some materials were revised: the new figures have been incorporated in the annual. This careful revision is typical of the amendments to the volume.

Last year a new section was included in *Chemical Industries*: this was a dictionary of raw materials used in the paint and allied industries; the term "allied" was not applied too rigidly. For the new edition the dictionary has been substantially increased, and now includes a considerable proportion of the vast range of raw materials used in the production of various classes of finishes.

Physical constant tables for drugs, pharmaceuticals and chemicals are included, as well as a dictionary covering perfumery materials.

Last of all is a comprehensive bibliography covering all the major sections of the chemical industry.

The indices, always a feature, have been revised and extended, cover subject-matter, advertisements, commodities, trade names and marks. The order of the main sections has been retained; they deal with materials of construction, power plant, factory equipment and layout, size reduction, separating and grinding, transportation, instruments, raw materials, heavy and fine chemicals, and complete mathematical tables.

Chemical Industries. 1939. *13th edition. Pp. lxxix*+380. *London. Leonard Hill Limited.* 10s.

Food for the African Menu

"PERHAPS the two greatest factors in deciding the daily menu of the African native are his environment and his wage-earning capacity. As regards environment, its most important bearing on the African's larder is the presence of game. Fish is perhaps the most readily obtainable of all animal life, because the poor fish is actually caught by even the primitive apparatus used by the native fishermen. What the fish are that teem in the great waters of the Congo, the Limpopo and the Niger no one knows except the natives who trap and eat them, but most of the varieties that I have come across would give any self-respecting fisherman in this country the creeps. They looked to me more than anything like the less attractive monsters that one sees masquerading as gargoyles on any old Gothic cathedral. African land game, on the other hand, is certainly more intelligent than the poor fish and, as such, is more elusive. Most parts of Africa are crowded with edible game, from the lordly elephant (whose feet are as much an edible delicacy to the native as *pâté de foie gras* to you and me) down to the hundred and one species of diminutive deer and antelope and even lizards. In fact, there are few varieties of fish, flesh, fowl or the African equivalent of good red herring that your native will not eat."

The above, broadcast in the Regional programme, was part of a talk by Merlin Minshall called "African Menu". It was printed subsequently in *The Listener.*

TINPLATE CORROSION TESTS

THE RATE of formation of hydrogen swells in canned fruit is largely dependent on the corrodibility of the steel base from which the containers are made.

Considerable variations in the rate of this corrosion have been noted and studied and investigations have for the most part been carried out in the laboratory with small strips of mild steel immersed in dilute citric acid solution.

Variations have been found not only from sheet to sheet, but also within a single sheet of steel base. The rate of corrosion has been correlated with variations in the chemical composition of the steel.

An important investigation of the relationship of the results of laboratory corrosion tests to the rate of formation of hydrogen swells in the canned product has been carried out by W. E. Rhodes.

He approached the problem by first selecting through laboratory tests uniformly fast- and uniformly slow-corroding tinplates, making these into cans, and packing the cans with fruit for uniform treatment in the canning process.

The cans were then stored for a definite period of time, and the rate of corrosion followed by periodically measuring the retention of vacuum in cans from each batch.

Real Fruit Juices Used

As already stated, other workers have for the most part used dilute citric acid as a corrosion medium, and this has been used as a criterion for deciding whether a steel is "fast" or "slow".

In Rhodes' investigation this was carried a stage further by employing in addition actual fruit juices as corrosion media. This, it was felt, would more closely approach conditions found in practice, and therefore might produce a better correlation between laboratory test and canning trial.

Laboratory corrosion tests were conducted as follows: Specimen strips, 7 by 2 cm., were cut from the sheet to be tested (when tinplate was employed the tin coating was completely removed); these were abraded and degreased by standardised methods, and weighed.

They were then placed in special glass vessels, a definite volume of corroding medium at 35° C. poured in, and the vessels put in a constant-temperature room at 35°, where they were allowed to remain for 96 hours. The specimens were then washed, dried and the loss in weight determined.

The canning trials were made with uniform fruit for each trial, and arrangements made so that processing conditions were identical. The finished product was stored in a constant-temperature room at 35°. During the succeeding stages of storage the vacuum was determined without puncturing the cans, by special apparatus.

Differences in the Steel

As already stated, the rate of corrosion of steel base in dilute citric acid has been correlated with differences in the chemical composition of the steel. These differences are in part due to the segregation of impurities occurring during the cooling of the molten steel ingot. It is therefore possible to select portions of the ingot which on subsequent rolling produce sheets of comparatively uniform chemical composition.

The results of the above experiments showed that there were two types of steel, one "variable" (rolled from un-cropped bars), the other "uniform" (rolled from cropped bars). It was seen that there was a very large and important difference between the corroding properties of the two types—slow-corroding properties were linked with uniformity, and fast-corroding properties with variability.

With this fact in mind tests, in which cans were packed with citric acid, were undertaken to determine (1) whether and to what extent a slow steel (as described) lengthens the life of the canned product; (2) whether a uniform type of steel gives greater uniformity to the life of the product.

Three facts arose from these tests: (1) it was seen that the cans made from the slow plate retained a fair vacuum; (2) that lacquered cans behaved very much like plain ones; and (3) that the variable steel produced erratic results when made up into cans. Some almost retained their original vacuum, others developed quite a high pressure.

The results showed that laboratory tests afford a useful indication of what is to be expected from canning trials when the cans contain only citric acid.

It has been shown that under such conditions of laboratory tests a higher pH generally markedly reduces corrosion. Before attempting any canning trials it was thought desirable to test the two types of steel in dilute citric acid, but under conditions more closely approximating to actual practice. Buffered citric acid solutions were used.

Further tests were made, using actual expressed fruit juices as corrosion media.

Canning trials with fruits spread over a period of several months were next conducted.

The results of these were in contrast to those obtained when cans were packed with citric acid solution in that the slow (or uniform) steel cans, in some instances, had not stored appreciably better than those made from fast (or variable) steel.

Actually black currants, strawberries and Victoria plums in slow steel cans were slightly to be preferred, whereas cherries and prunes were definitely worse.

This result is in accordance with the strip tests in fruit juices, which indicated that the superiority of the slow steel cans used in these canning trials would not be very marked. The difference in variability of the two sets of cans which was found was, however, significant.

Wide Variations with Loganberries

This was most apparent with loganberries, which in variable-type steel cans retained a vacuum of 10·5 in. at one extreme of the range of results, and developed a pressure of 18·5 in. at the other, while every other fruit tested, except Victoria plums, gave a bigger range with this type of can. Gooseberries, the only fruit packed in unlacquered cans, retained a much higher vacuum in slow steel cans.

Throughout these investigations, says the author, it was realised that only two factors, speed and variability of steel base, were considered, and that, while many others could be ruled out under the existing conditions, the result of canning trials in particular must be affected by such matters as damage to lacquer in forming the can, influence of tin coating and tin ions in solution, porosity of tinplate to hydrogen diffusion, and so on.

It was apparent, however, that although laboratory tests of fast- and of slow-steel base in dilute citric acid indicated a greater difference in the rate of formation of hydrogen in canned fruits than was subsequently found, they were not invalidated by the other factors which also came into operation in the canned product.

Further work on the lines indicated should more definitely decide under what conditions it is safe to forecast the effect of the speed factor of the steel base on the life of the canned product.

It has not been possible to give more than the barest description of these experiments, or the results found, but the following conclusions are drawn:

(1) The storage life of cans filled with one and the same batch of fruit and packed under almost identical processing conditions may be subject to wide variation and cannot normally be forecast.

(2) While the rate of corrosion of steel base in dilute citric acid solution bears some relation to the life of the tin container, it is preferable, if a true indication of the relationship is to be obtained, that the corrosion medium for laboratory tests should approximate to that which will be used in the canned product under consideration.

It is suggested that the expressed juice of the fruit in question provides the most favourable medium. Under such conditions a fair measure of correlation may be expected.

(3) Results of laboratory tests and canning trials may be vitiated if the variability of the steel under consideration is very great. Only the employment of a large number of samples and, possibly, a statistical analysis of the findings would enable this factor to be controlled.

It would appear preferable to select a uniform type of steel base for all experiments in which other variables are in question.

The tests were described fully in the *Journal of the Society of Chemical Industry*, September, 1938.

Canning History

(*Continued from page* 51)

wits for nearly a century and which is not yet satisfactorily solved.

In 1868 Peltier and Paillard of Paris varnished the interiors of their cans with a mixture of gum copal, linseed oil and turpentine, "fixed by heat or otherwise". In 1882 Parry and Cobley suggested the use of a mixture of sodium silicate, calcium silicate, serum of blood, gluten, waste starch liquor or vegetable or animal albumen. The mixture was applied to the tinplate, dried and then treated with dilute mineral acid in order to precipitate silica in an insoluble form in the film.

Lacquering

Lacquering is practised considerably at the present time and, in fact, there are some who consider that no food products should be packed in cans which are not lacquered. The manufacture of lacquer is a job of its own and requires to be carried out by experts in this art. It is gratifying to record that varnish-makers have kept abreast of the times, and nowadays (especially since the tremendous field opened up by the introduction of synthetic resins has begun to be explored) the can-maker has a range of first-class lacquers to choose from.

History deals with the past. We are living in the present and for the future. But in times of speed such as ours are it may be good for us to stop occasionally and look back, to rekindle our enthusiasm and take fresh inspiration from the good work of our forefathers, whose efforts have brought us to our present degree of perfection, which is yet intermingled with imperfection.

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[1] B.P. No. 3372.
[2] Lewis and Drummond, *Chemistry and Industry*, 1938, **57**, p. 868 *et seq.*
[3] B.P. No. 6432.
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A.R.P.

Home Storage of Food Supplies

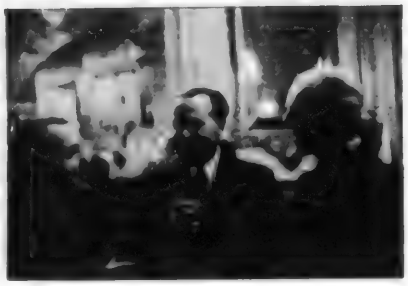
COINCIDING to the day with Sir Auckland Geddes' remarks on home food storage, was issued a booklet by the Canned Foods Advisory Bureau entitled *A.R.P.: Home Storage of Food Supplies*, which is being distributed free on application to grocers, institutions, and the like.

Treating exclusively of canned foods, it gives instructions on why, what, how much, how, and where to store, also how to make the best of the food stored.

Representative parcels, costing 5s., 10s. and £1 are detailed. The selections are based upon the proper balance of protein, carbohydrate and fatty foods, and due account has been taken of those containing mineral salts.

The Advisory Bureau may not only be congratulated upon their initiative but also upon the timing of their effort.

CANNING CLUB CHOOSES NEW PRESIDENT



(L. to R.) Mr. Maurice Batchelor, Mr. G. H. Dawkins and Mr. Roland Arnison at the dinner.

At its last dinner the Canning and Food Industries Club elected President for 1939 Mr. Roland Arnison, Managing Director of Short and Mason.

In his inaugural speech Mr. Arnison made an important reference to the part food industries would have to play in the event of a national emergency.

"I would like to strike one serious note," said Mr. Arnison. "My firm has been actively engaged during the past months in connection with the Government's rearmament programme. It is quite certain that if an emergency should arise food manufacturers would have a serious part to play; no less serious would be that of the suppliers of equipment. Such a situation would call for a united effort of us all, for co-ordination and co-operation. The times ahead may make big demands upon us. It may be that this club will be able to play its part."

Mr. Maurice Batchelor, who vacated the chair as President, said that he thought one of the club's attributes was its spirit of good fellowship; and that it had been possible to achieve tolerance among those who were in keen competition.

Reviewing the past year, Mr. Batchelor referred to the national crisis and the resultant lack of confidence. He considered, however, that a new spirit of confidence was arising.

Mr. Batchelor paid tribute to Mr. W. S. Smedley for his successful introduction into this country of Quick-frozen Foods. He regretted that Mr. Smedley was unable to be present owing to ill-health.

When Mr. Batchelor and Mr. Arnison changed places, Mr. Arnison said he would do everything in his power to further the interests of the club during his year of office.

Mr. Batchelor proposed that Mr. Charles Snell be re-elected as Honorary Secretary and Treasurer of the club. This was carried unanimously.

Proposing the toast of "The Guests", Mr. W. Leonard Hill said that what they would have noticed about the club was its informal spirit of friendship, which was all-pervading. He hoped that those who were present as guests that night might one day be welcomed as new members.

Correspondence

The Editor.

SIR,

In your January issue appears what purports to be a description of the Haslacher process for frozen foods. This description appears to assert that the process described is under use by Garden Fresh Foods, Ltd.

As inventor of the Haslacher process, may I state: neither my own services nor my process are now in any way connected with Garden Fresh Foods, Ltd., also that the description was of a now obsolete wet pack.

I resigned my connection with the Company in October of 1938 and notified it that my name was not to be used in any way in future connection with the Company's affairs.

The Haslacher process is strictly a dry pack and I packed many thousands of cartons for Garden Fresh Foods, Ltd., during the past summer, every one of which was dry packed and all of which gave perfect satisfaction.

The Haslacher process is dry pack preceded by a system of pre-cooling and freezing in circulating brine, using original and novel methods. The total cost of freezing does not exceed 5s. per ton, and I believe it to be the most economical and practical of all fast-freezing processes.

Yours faithfully,

ALFRED B. HASLACHER.

HIGHGATE, N. 6.

We have also been informed by Mr. Walter S. Josephson of Garden Fresh Foods, Ltd., that his Company discontinued the use of the Haslacher process and that, therefore, its association with his name in our January issue was incorrect. He states that the Company is now using a process of his own invention.

The description of the Haslacher process was taken from an article which appeared in our contemporary, Food Industries Weekly, *last February.*—ED.

Food Psychology (*Continued from page* 58)

to a different cylinder. The different displacements of the two cylinders required to detect a difference forms the yardstick of the threshold of differences.

The results obtained are very valuable both for the science and practice of food production. It has been definitely established that differences in the odorous power of substances can be detected only by the nose when the difference of intensity amounts to 30 to 35 per cent. Smaller differences cannot be recognised.

These figures must appear surprising. They can be explained by pointing out that intensities and not qualities are measured and minute changes which we are accustomed to detect embrace qualities as well as intensities. A full explanation was first given by the author after personally carrying out measurements on foodstuffs. This had not previously been done, all investigations having been carried out on pure smelling stuffs, and not on complex mixtures such as foodstuffs. The apparatus of Zwaardemaker uses a liquid solution of the odorous substance, but not all foodstuffs are liquids. The author was therefore compelled to devise an apparatus suitable for both solids and liquids, but completely in line with the yardstick principle. *Measurements with this apparatus have revealed very much greater customary differences in flavour intensities of foodstuffs of the same kind than have been assumed in practical experience without using the yardstick.*

The differences frequently attain several hundred per cent., so that it will be understandable why those amounting to less than 30 to 35 per cent. are not detectable in foodstuffs, although these percentages might appear somewhat high to the ordinary observer.

AGRICULTURAL DEVELOPMENT OF SOVIET SUB-TROPICS

SUBTROPICAL AGRICULTURE in the Soviet Union, one of the youngest branches of agriculture in the country, is developing at great speed, and is fast becoming an important branch of national economics. The Soviet subtropical districts produce valuable food and industrial crops—tea, tung oil, citrus and other subtropical fruits, essential oils, cork, gutta-percha, new spinning fibres, vegetable fibres, ornamental trees and flowers, saffron, almond, cardamom, bay leaves, tanning materials, crude drugs, essential oil of rose, quinine, cocaine, valuable species of timber, etc.

Tea is the principal crop grown in the Soviet subtropics. Before the revolution (in 1913) the tea plantations of Russia occupied an area of 862 hectares; the total crop of green tea leaves gathered in that year amounted to 550 tons and the total quantity of tea manufactured was 191 tons. At the beginning of the First Five-Year Plan (1928) the area under tea equalled 1,806 hectares. As a result of the intensive development of tea cultivation during the progress of the Plan, in the last year of it, 1932, the area planted to tea was increased to 25,742 hectares, while the crop of leaves gathered in the same year amounted to 1,609 tons.

Much work was carried out both prior to and during the First Five-Year Plan in the organisation of the manufacture of tea. Three tea factories were built in 1926, one in 1927 and three in 1930. The output of bohea tea by the factories in 1926 amounted to 196,500 kilograms. In 1932, fourteen factories produced 396,600 kilograms of bohea tea.

The leading state and collective farms gather 3 to 3½ tons of green leaf per hectare of tea plantation, this yield being equal to that of Indo-China, Ceylon, and British India.

The gross crop of tea leaves and the output of bohea tea are increasing year by year, as may be seen from the following table:

	Leaf Crop in Tons.	*Output of Tea in Kilograms.*
1932 ...	1,609	396,600
1933 ...	3,166	757,900
1934 ...	6,649	1,382,400
1935 ...	12,662	2,500,000
1936 ...	19,250	4,300,000
1937 (plan) ...	26,370	6,200,000

Under the Second Five-Year Plan a still further extension of tea growing took place. In 1937 the area of tea plantations was brought up to 45,000 hectares, distributed as follows: 42,658 hectares in Georgia, 550 hectares in the Azov-Black Sea Territory, and 1,792 hectares in Azerbaijan.

The crops next in order of importance in the Soviet subtropics are citrus fruits. In 1913 the citrus groves in Western Georgia covered an area of 400 hectares (about 200,000 trees); in 1928 the area of the citrus groves was 462 hectares. As in the case of tea, the First Five-Year plan saw a rapid extension of citrus cultivation. By the end of 1932, the total area covered by the citrus groves equalled 2,694 hectares (over 1,400,000 trees), that is to say it had increased more than six-fold. By the end of the Second Five-Year Plan, the area planted with citrus will be increased to 4,940 hectares, including 1,500 hectares of dense plantation (800-900 trees per hectare).

The year 1936 marked the turning point in citrus cultivation in the Soviet Union. On a decision of the Soviet Government, plans were made to extend the citrus plantations in the subtropical districts of Georgia with a view to their covering 20,000 hectares by the end of 1940.

The development of nursery farms during the latter period of the Second Five-Year Plan has made possible the realisation of this vast scheme for new plantations by the use, mainly, of biennial standard stock. The area of citrus nurseries has increased from 45 hectares in 1934 to 103·3 hectares in 1935 and 780 hectares in 1937.

The citrus crop in 1932 amounted to 29 million fruits. This year it is estimated that a crop of 500 million citrus fruits will be gathered.

The overgrowths of wild nut in the republics of Central Asia are of great economic importance. The area of the nut shrubberies (in hectares) is shown as follows:

Republic.	*Walnut.*	*Almond.*	*Pistachio.*	*Total.*
Kirghizia ...	48,785	1,718	6,093	51,596
Tajikistan ...	24,400	21,628	177,400	223,423
Turkmenistan ...	100	—	26,500	26,600
Uzbekistan ...	100	—	4,062	4,162
Total ...	68,385	23,346	214,055	305,781

In recent years much scientific research has been carried out in planning the exploitation of these natural resources.

The young Soviet republics of Tajikistan, Uzbekistan, and Turkmenistan in the regions of the Soviet dry subtropics have taken bold steps towards the extensive introduction of subtropical fruit plants. Different kinds of nurseries and special orchards have been organised to act as a local source of supply of stock material. The collective farms situated in districts more suitable for the cultivation of subtropical crops are being reorganised on a specialised basis.

Crops in the humid subtropics of Georgia now occupy an area of 67,000 hectares. The total area of the plantations, as compared with 1913, has practically doubled, but there is still plenty of room for extension. The humid subtropics of Georgia possess 1,457,500 hectares of arable land, about half of which is suitable for growing subtropical crops.

NEWS FROM THE INDUSTRY

MORE FOOD VARIETY FOR DIABETICS

Diabetics will benefit considerably from exhaustive analyses made to determine the carbohydrate content of their products carried out by Crosse and Blackwell, Ltd. The idea of the research was to show that the diet of diabetics may be more varied than hitherto. The results of the analyses have been published and sent to diabetic clinics and hospitals. The literature lists the C. and B. products which are free from carbohydrates and indicates the amounts contained in the others.

The canned soup table, which is based on the carbohydrate content of the soup after adding water equal to one-half of the can, shows the weight in ounces of the diluted soup equivalent to a "half portion"—*i.e.*, 5 gm.—of carbohydrate. Thus we find that a diabetic can take 5 oz. of cream of asparagus soup in one helping with safety, but only 2½ oz. of mulligatawny. Mock turtle, clear oxtail, cream of oyster soup, chicken broth, consommé, etc., can be taken in average helpings; these are taken from the list of nine soups whose carbohydrate content is negligible.

Gorgona anchovies, fish in tins, bottled herbs and olives, fish pastes and pickles in malt vinegar are some of the thirty different products which are also practically carbohydrate-free. Another list detailing other "safe" amounts lists, for instance, 1¼ oz. of chicken and ham galantine as equivalent to 5 gm. of carbohydrate. Other "safe" products are salmon and anchovy paste (3½ oz.), green peas (1½ oz.), piccalilli (6 oz.), etc.

Making Price-Cutting a Crime

Following closely on the Wheeler-Lea amendment to the Federal Food, Drug and Cosmetic Act, which outlaws misleading advertisers, comes a model act covering unfair sales practices, which has been developed by the American National Food and Grocery Conference. It is intended to serve as a copy for legislation which may be proposed in the 36 states which as yet do not have any measures for controlling unfair practices. The new model statute, covering only 1,000 words, is interesting in that it has been based largely on court rulings which pointed out flaws in legislation termed unconstitutional.

The latest unfair sales act termed unconstitutional in America was the one operative in the State of New Jersey. Therefore the drive to put a floor under both wholesale and

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Production of Sugar in U.S.S.R.

It is reported in *Pravda* that by January 1, 1939, the Soviet sugar factories had turned out 1,781,400 tons of granulated sugar from the beet crop of 1938. The total output of sugar by the Soviet sugar factories in 1938 was 2,483,870 tons, being 100,645 tons more than was produced in 1937.

* * *

Chemical Merger

Three chemical businesses have combined to make one firm. They are the Old Strand Chemical and Drug Co., Ltd., Biddle, Sawyer and Co., Ltd., and Leslie Dodds, Wood and Co. The combination will be known as Biddle, Sawyer and Co., Ltd., with offices at Empire House, St. Martin's le Grand, London, E.C. 1, telephone, National 3831.

Mr. Herbert A. Berens, managing director of what was the Old Strand Chemical and Drug Co., Ltd., will fill a similar capacity with the new company. Besides Mr. Berens other members of the Board of Directors are: Sir A. E. Dunbar, Bt., M.C., and Messrs. A. S. Todd, F. R. Ruffer, M.B.E., E. R. H. Pollak, M.C., A. A. Biddle and A. J. Snell.

The new company will trade in exactly the same way as the Old Strand company, supplying the same products for which the firm became famous, such as "Toseat" brand fine chemicals, drugs and essential oils.

BENGER'S NEW FACTORY

The new factory and research laboratories of Benger's Food, Ltd., at Holmes Chapel, Cheshire, have been described as shining examples of modern planning in their design, layout and lighting arrangements. The main block of the buildings houses the offices, laboratories and executive departments in its two storeys. The manufacturing departments are single storied and occupy a rectangular site with a centre courtyard. The usual stores, packing and dispatch sections adjoin. All walls and floors are tiled or otherwise suitably treated to give a bright and pleasing effect, and all the buildings are of steel-framed construction.

Lighting throughout is by Siemens gas-filled lamps in Benjamin reflectors of the "Glasteel" and "R.L.M." patterns with "Sphere" fittings. These arrangements have been specially planned to conform to the requirements of the new Factories Act. The wiring throughout has been accomplished with the Siemens "Stannos" system.

Mr. W. Leonard Hill, chairman of Leonard Hill Limited, was given an enthusiastic farewell by members of the staff at Waterloo Station on Friday evening, January 13, when he started for a business tour of the U.S.A. accompanied by Mrs. Hill. During his two months' visit over there he will attend the International Canning Convention in New York.

retail food prices in America is checkmated in three states: New Jersey, Minnesota and Nebraska. However, three acts—namely, in Kentucky, California and Tennessee—have been upheld, even though some observers feel that they contain objectionable features, and rulings are being awaited in nine additional states.

The prelude to the act indicts price-cutting as an unfair method of commercial competition, misleading the consumer, indirectly harming the farmer and robbing honest dealers. Section 2, which defines costs of retailers and wholesalers, is the gist of the act and section 4 states the penalties. Any retailer . . . or any wholesaler who contravenes the act either by advertising, offering to sell or actually selling merchandise at less cost than is categorically stipulated in the act, will be fined $500.

The days of the American racketeers will be numbered if this model act becomes law. We hope they will not scuttle across to this country.

* * *

Scottish Milk Board Appointments

To fill the vacancy created by the resignation of Mr. F. A. Bell on his appointment as a member of the Herring Industry Board, the Scottish Milk Marketing Board have elected Mr. J. Ure Primrose of Perth.

As Mr. Bell was also vice-chairman of the Board this vacancy has been filled by the appointment of Mr. J. B. Douglas.

* * *

Canadian Canned Asparagus

Although fresh asparagus is imported into the United Kingdom from France and other countries, Canada and the United States, so far as is known, are the only countries supplying the British market with canned asparagus. The United States is the principal supplier, and, while the Canadian supply is comparatively small, it is increasing, 18,315 cases having been exported during the fiscal year 1937-38. This represents approximately 26 per cent. of the total exported to the British market by the two countries.

* * *

New Refrigerating Concern

A new organisation has been started to carry out the marketing and eventual manufacture of refrigerating and air-conditioning equipment, also portable electric tools of all types, temperature and pressure control instruments, switchgear, etc.

It is Stanelco Products, whose offices are at 163, Great Portland Street, London, W. 1, and who are an offshoot of Standard Telephones and Cables, Limited.

* * *

Potato Board's New Vice-Chairman

The Potato Marketing Board has appointed Mr. William Hemmant, of Peterborough, as vice-chairman of the Board in succession to Mr. Alexander Batchelor of Dundee, who has resigned the vice-chairmanship for health reasons.

Mr. Hemmant is a county J.P. for the Isle of Ely, and has served on the Board as a district member for the East Midland District, and also on the Executive Committee since the scheme came into operation at the end of 1933. He has for ten years been the Chairman of the Peterborough and District County Branch of the National Farmers' Union, a county delegate for a like period on the National Farmers' Union Council in London, and he is a member and vice-chairman of the Cereals Committee at Bedford Square, as well as being a member of the Potatoes and Sugar Beet Committees.

The vacancy on the Executive Committee of the Board has been filled by Mr. Archibald Dryburgh, of Methilhill Farm, by Leven, Fife. Mr. Dryburgh, besides farming potatoes, maintains a substantial dairy farm of tuberculin-tested herds. He serves on the Scottish Board of the National Farmers' Union Mutual Insurance Society and is chairman of Central Farms, Ltd., of Methin, Fife. He is also a director of a large Fifeshire road haulage concern and a director of the Kirkcaldy Ice Rink.

Mr. Alexander Batchelor, the retiring vice-chairman, is a man of wide business interests. He has been a member and vice-chairman ever since the Board came into being.

* * *

Health Congress President

The Right Hon. the Earl of Harewood, K.G., G.C.V.O., has accepted the office of president of the Health Congress which is to be held at Scarborough from July 3 to 8 by the Royal Sanitary Institute.

The Congress will be divided into sections dealing with Preventive Medicine; Engineering, Architecture and Town Planning; Maternity, Child Welfare and School Hygiene; Veterinary Hygiene; National Health Insurance; Hygiene in Industry; Tropical Hygiene.

* * *

Knighthood for B.I.F. Chief

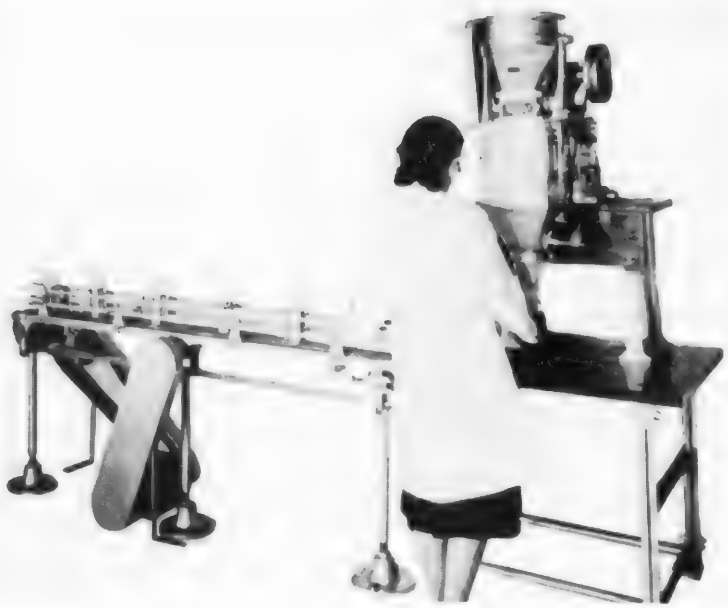
A K.C.M.G. to Mr. T. St. Quintin Hill, C.M.G., O.B.E., was announced in the New Year Honours List. He is Comptroller-General of the Department of Overseas Trade, which organises the Fair in London and collaborates with the Birmingham Chamber of Commerce, who organise the Fair at Castle Bromwich.

* * *

P. and S. Jubilee

Instead of a reception as was originally planned to celebrate the fiftieth anniversary of Polak and Schwarz, Ltd., the Dutch flavouring essence and essential oil house, the works at Zaandam and Hilversum were closed on January 7 and employees were paid a bonus commensurate with their length of service. This was because of the untimely death of Mr. Samuel Schwarz, their managing director, which was reported in a recent issue.

To commemorate the jubilee a handsome booklet has been prepared and it serves as a tribute to the



An automatic weighing machine in combination with a vibrating conveyor as supplied to a leading packer of infants' and invalids' foods. The method of operation is interesting. The liners are first inserted into the tins, after which the operator at the weighing point takes the accurately weighed discharge of material into the container, passing to the conveyor. While passing along, the material which stands above the normal height in the liner bag is gradually vibrated down and is ready for the next operator to fold the bag and lid the container. Similar adaptions are also made for bags, cartons, etc., where dumping is necessary to get the material down to the proper level. The length of conveyor, amount and type of vibration is arranged to suit each individual job after careful test. This machine is made by the Automatic Weighing and Packing Machine Co., of Birmingham.

memory of Mr. Schwarz. The text takes the form of a non-technical interview on the business of the company given by him just before his death. The booklet is finely illustrated with lavish colouring; it is plastoic bound.

As a gift on the occasion of their jubilee the firm have distributed to trade friends a luxurious, tooled leather desk blotter.

* * *

Progress at Treforest

It is now just over two years since construction work started at the Treforest Trading Estate, South Wales. In two years the estate has sprung from a few meadows with unkempt hedgerows to a spacious site with well-spaced roads and clean, airy factories. Now 38 factories have been erected and 32 are in production. Another 20 factories are being built.

The estate stands beside the River Taff, which has been specially bridged to give a rail connection. The main road is an 80-feet wide double-track carriage-way.

Over 1,000 people work in the Treforest factories and a further 600 are engaged on construction work.

Bacteria Destruction with Ultra-Violet Rays

Although it is essential that bottles intended to hold milk or fermented beverages should be clean and practically free from bacteria, it is difficult to guarantee their sterility before filling. A machine to overcome this uncertainty has been invented. It effects treatment after the containers have been washed in the usual way.

The machine utilises ultra-violet rays, which play directly on to the entire surfaces of bottles or other containers to be treated. This action is claimed to destroy bacteria. The method is to bring the ray tubes, from which the ultra-violet light emanates, within the container for a predetermined period. The radiating tubes are placed in a line of 6, 8, 10, 12 or 16, according to the size of the machine. It is understood that 1,000 dozen bottles can be treated with the consumption of about two to three units of electricity. In every case, however, the treatment is applicable only when the bottles are to be filled immediately afterwards.

R. Powley and Son, Ltd., of Sunderland, make the apparatus.

National "Safety First" Association Scholarship

Through the generosity of Imperial Chemical Industries, Ltd., the National "Safety First" Association will award a Travelling Scholarship of £100 in the year 1939, to be spent on a visit to the United States and Canada to study various methods of preventing accidents which have been adopted in those countries. The scholarship will be awarded to the writer of the best essay on "The Prevention of Accidents among Young Persons." Candidates must be between the ages of eighteen and twenty-five, and part- or whole-time students at a recognised educational institute, college or university, or articled apprentices. The essay, which should deal only with industrial and/or road accidents, must not be more than 5,000 words in length.

Further details may be obtained from the General Secretary, National "Safety First" Association, 52, Grosvenor Gardens, S.W. 1.

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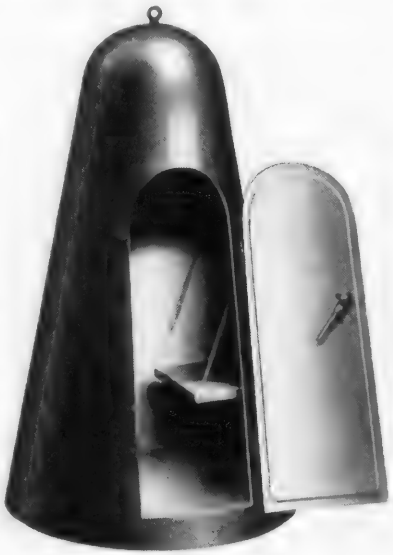
Portable A.R.P.

The argument that workers in key industries such as food manufacture must be provided with suitable shelters in case of war is put forward by Constructors, Ltd., of Birmingham,



to publicise their "Consol" portable air raid shelters. Made from bullet-proof steel plate these conical shelters are available in three sizes ranging from that suitable for the protection of one man to one, 7 feet high and 4¾ feet in diameter, designed for four men. The weights of the shelters rise from 9 cwt. to 14 cwt.

The shelter is claimed to provide protection against splinters, shrapnel, falling masonry, glass and other flying debris.

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Hull's Industries Surveyed

Issued from the Hull City Laboratories, a book written by the City Analyst, Arnold R. Tankard, F.I.C., surveys the imports, raw materials and synthetic products and their relationships to the old and newer industries, with special reference to the position in the Humber area. It is an extended survey based on the author's former list of imports and raw materials drawn up in 1930 for the guidance of the Hull Development Committee in connection with their negotiations for the establishment of new industries in Hull. The list has been enlarged and revised and the scheme expanded on the lines suggested by Professor F. G. Tryborn, D.Sc., of the University College, Hull, in his report to the Development Committee in February, 1935. The book is priced at 2s. 6d.

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Vacuum Filter

Vacuum is used as the motive power in the Stream-Line laboratory filter. Filtering edgewise between end-compressed filtering papers, particles of the order of a millionth of an inch in diameter are held back. For precision work, a spring-loaded model is available. Accumulated solids are removed by reversal of the vacuum.

Our Packaging article in the December issue referred to food in tubes. Here is an example of British tube food, J. and J. Colman's *Pic-Nic* Mustard packed for the holidaymaker.

OBITUARY

Mr. Arthur William Knapp

The death of Mr. Arthur W. Knapp, M.Sc., F.I.C., Chief Chemist, Cadbury Bros., Ltd., on January 6, at the age of 58, removes a figure of international reputation from the cocoa and chocolate industry.

He was a Birmingham man, and was educated at King Edward's Grammar School, Aston, and at Birmingham University. He graduated B.Sc. of Birmingham and London in 1901, and M.Sc., Birmingham, in 1928. In 1903 he passed the examination for the Associateship of the Institute of Chemistry, becoming a Fellow in 1906. He was also a member of the Institute of Chemical Engineering.

He held appointments in Public Analysts' Departments in London where he did work for Mr. (now Sir) George Newman—in Belfast and in Birmingham, and in the Research Laboratory of Lever Bros., Ltd. In 1911 he became research chemist to Cadbury Bros., Ltd., Bournville, becoming chief chemist in 1923.

While occupying these last-mentioned positions, he carried out much research work of great importance to the industry as a whole, was the author of standard works on cocoa and chocolate, and of numerous scientific papers published in British and foreign technical journals. His knowledge of the problems of the cultivation and fermentation of cacao made him an authority whose views were sought by growers and manufacturers in many parts of the world, and gained for him in 1935 the Médaille de Mérite de l'Office Internationale du Cacao et du Chocolat. He spent some time in the plantations of both the West Indies and the Gold Coast.

He held a high place in his own profession, having served on the Councils of the Institute of Chemistry, the Society of Chemical Industry, the British Association of Chemists (of the local sections of all of which he had been chairman), the Society of Public Analysts, and of the Midland Chemists' Committee, of which also he had been chairman. He was also a member of other scientific bodies. In the summer of 1938 he attended the annual meeting of the Society of Chemical Industry in Canada.

Besides his so widely recognised scientific attainments, Mr. Knapp was endowed with considerable artistic sensibilities and literary skill. He was an accomplished amateur actor and producer, and a witty and knowledgeable writer on many matters outside his own profession. His non-scientific writings included an essay on Nietzsche, the German philosopher, two or three plays, and humorous and critical contributions to various journals. He was a member of the Fabian Society.

Mr. Knapp leaves a widow and two children.

The late Mr. A. W. Knapp.
Cocoa expert and amateur actor.

* * *

Professor George Barger

On January 5 while holidaying at Aeschi, Switzerland, Professor George Barger, M.A., D.Sc., F.R.S., Regius Professor of Chemistry at Glasgow University and famous research worker on alkaloids and natural products, died from heart failure. He was 60 years of age.

Educated in Holland; University College, London; and King's College, Cambridge (of which he was a Fellow from 1904 to 1910), Professor Barger had his first academic appointment from 1901 to 1903 as demonstrator in Brussels University. After this he spent six years as chemist at the Wellcome Physiological Research Laboratories. After various other appointments, which included that of chemist on the staff of the Medical Research Committee (Department of Biochemistry and Pharmacology) for the duration of the Great War, he was appointed Professor of Chemistry in Relation to Medicine at Edinburgh in 1919. In that year he was elected F.R.S., and in October, 1937, he succeeded Professor G. G. Henderson as Regius Professor of Chemistry at Glasgow. Professor Barger's work on alkaloids and other natural products has been described as noteworthy; for it he was awarded the Davy medal by the Royal Society.

He contributed many papers to scientific journals and he published various works, among which were *The Simpler Natural Bases*, 1914; *Some Applications of Organic Chemistry to Biology and Medicine*, 1930; *Ergot and Ergotism*, 1931; and *Organic Chemistry for Medical Students* (second edition), 1936.

INFORMATION AND ADVICE

Mayonnaise and Mustard Recipes — Butter in Ice-Cream — Linseed Powder for an Egg Substitute — Machinery for Resale — Making Paper Barrels

Mayonnaise and Mustard Recipes

4,754. *Please furnish us with recipes for mayonnaise, salad dressing and mustard for ordinary containers and tubes.* (Norway.)

MAYONNAISE

Mayonnaise to be up to the standard should consist of a clean, sound, emulsified preparation composed of edible vegetable oil, egg yolk or whole egg, vinegar, lime juice, or other edible acid, and (maybe) salt, sugar, and stabiliser. There may not be less than 50 per cent. of oil and not less than 6 per cent. of egg yolk solids, whether from fresh or dried egg products. In the finished material the total of oil and egg yolk, apart from white of egg, amounts to 78 per cent., and there may not be more than 1 per cent. of the stabiliser.

SALAD CREAM

Whole egg	100 lb.
24 grain pale malt vinegar ..	12 gal.
Tarragon vinegar	6 ,,
Olive oil	12 pints.
Unsweetened condensed milk	1½ gal.
Sugar	14 lb.
Mustard	12 ,,
Salt	5 ,,

Raise the vinegar, sugar and salt to 180° F. in pan and pass through a sieve. Mix the oil and mustard. Beat the eggs for half an hour in a warm beater. Add the oil and mustard. Then add the sugar, vinegar and salt, and finally the tarragon vinegar. Heat gently to 175° F. and continue beating for about an hour. Add the condensed milk and pass through a homogeniser. Afterwards fill.

MUSTARD

The essential ingredients are yellow corn meal and ground mustard seed, along with salt, colouring matter, vinegar, and a little Worcester sauce.

Names of suppliers of plant for canning chicken were given.

Butter in Ice-Cream

4,805. *I believe it is true to say that edible fat or oil such as butter or groundnut oil is used in the making of ice-cream. I write to ask if you can confirm this, and if so, if you can say how the fat is stabilised against separation from the watery portion of the ice-cream. It would appear necessary to incorporate an emulsifying agent with the oil or fat. If you could give me one or two recipes for ice-cream illustrating the incorporation of fat it would be very helpful.* (Peckham.)

Butter—*i.e.*, salt or unsalted—is used in ice-cream as a substitute for cream. It cannot be used, however, unless the mix is to be homogenised, otherwise that will contain little lumps of butter in the final state. The addition of butter is a handy method of adjusting the fat content of balanced mixes. For fuller information we would refer you to Chapter XVIII of *The Making of Ice-Cream*, by Leonard R. M. Feltham. The chapter gives details of the method of use and recipes—*e.g.*:

Milk	7½ pints.
Butter	10 oz.
Skim milk powder	9 ,,
Sugar	25 ,,
Gelatine	1 ,,

Instead of gelatine you might use some of the other stabilisers on the market.

Linseed Powder for an Egg Substitute

4,641. *Can you give us some information on a grade of linseed powder or jelly or a similar linseed preparation which is employed in the manufacture of an egg-saving liquid to be used in cake production in the bakery trade?* (Croydon.)

We regret we have no information on the manufacture of egg substitutes involving the use of linseed powder or jelly base. If you wish to make this product, we suggest you submit a sample to a consulting chemist, and ask him to match it. We will be pleased to suggest one to you.

Machinery for Resale

4,487. *We wish to know the names of firms who could supply us with electric chip-cutting machines for resale.* (Glasgow.)

We do not know of any firms other than those mentioned in your letter who could supply you with electric chip-cutting machines for resale.

Making Paper Barrels

4,755. *Please put me in touch with manufacturers of machines capable of winding strong paper into cylinder form for use as barrels. These cardboard barrels are being used extensively in America, and I presume that English companies are also producing the necessary machinery.*

The names of firms were given.

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RECENT PATENTS

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

Food Preservation with Cocoa Beans

Vegetable and essential oils, fats, organic colouring matter, rubber, and other materials which contain or consist of unsaturated organic compounds are preserved against deterioration by oxidation by incorporating in the material moderately roasted cocoa bean or moderately roasted cocoa-bean shell so as to enable the material to absorb anti-oxidants therefrom. Alternatively, an anti-oxidant-containing extract is obtained from the moderately roasted bean or shell by an evaporable solvent—*e.g.*, water—at from 60° to 90° C., the extract being incorporated with or without concentration in the material. A preliminary de-fatting extraction of the bean or shell with petroleum ether or carbon-tetrachloride is desirable. In the treatment of an oil or fat it is heated to 60° C. with 2 to 10 per cent. of moderately roasted bean or shell, which is afterwards removed by filtration and re-used. In the case of a partially hydrogenated edible fat the addition of 5 per cent. by weight of de-fatted, ground, moderately roasted shell and a heating treatment of 120 minutes' duration are stated to be satisfactory. The shell may be removed by centrifuging. In preparing a water extract the de-fatted moderately roasted bean or shell is preferably ground, and, after filtration, the extract is concentrated to a syrup or completely dried by spraying or *in vacuo*. One per cent. of the dry extract may be mixed with the material. In the treatment of essential oils—*e.g.*, orange oil—the bean or shell is about 10 per cent. of the oil and is left in the oil until it is used. According to the provisional specification, the unroasted bean or shell may be used. The extract may be beaten into margarine or emulsified with the fat used in the preparation of margarine. The formation of resinous bodies and/or the development of colour and odour in petroleum hydrocarbons, especially cracked distillates, in storage, may be inhibited by heating with 5 per cent. by weight of ground cocoa-bean shell or an extract thereof.

492,714. British Association of Research for Cocoa, Chocolate, Sugar Confectionery, and Jam Trades, Macara, T., Stainsby, W. J., and Campbell, L. E.

Preserving Cream and Butter

Centrifuged or recentrifuged cream having a fat content equal to or higher than that of butter is treated to withdraw the air therefrom by passing it in a thin layer or film through a vessel which may be heated or cooled and in which it is simultaneously subjected to vacuum, the cream being then standardised to the composition desired—*e.g.*, by accumulating it in bulk and agitating it to mix the ingredients thereof, the cream being next delivered while sufficiently fluid under vacuum or atmospheric pressure into containers capable of being hermetically sealed, the containers being then heated to destroy practically all bacteria and spores in the cream, which is then cooled. The containers, after sealing, may be subjected in an autoclave or like apparatus to the heat treatment and may then be rapidly cooled—*e.g.*, by immersion in a cold liquid—the cream being thereby converted into the form of newly churned butter in a granulated state. Alternatively, the cooling may be effected slowly and the product may be treated or worked for conversion into butter when required. The cream treated may be obtained by centrifuging milk to give a cream of 30 to 40 per cent. fat content, which is then heated to pasteurising temperature or to 135° to 145° F. and recentrifuged to give a cream having a fat content of 80 per cent. or higher. The first centrifuging may be dispensed with. The cream may be distributed centrifugally into the thin layer or film for the vacuum treatment.

493,445. Hartmann, S. H.

Curry from Onions and Spices

A curry is prepared by boiling a preparation of onions, coriander seeds, dried chillies, and turmeric mixed with ground methi (fenugreek) seeds, cummin seeds, and mustard seed in vegetable oil, cooling, and adding fresh fish or fresh meat thereto. The mixture may next be placed in tins and boiled—*e.g.*, for 40 to 50 minutes at 240° to 250° F.—and then cooled and the tins sealed and sterilised—*e.g.*, by heating at 240° to 250° F. for 20 to 30 minutes. As described, the coriander seeds, dried chillies, and turmeric are mixed, ground, and then formed into a paste with water. A mixture of vegetable oil and onions cut into small pieces is boiled for 10 minutes, the paste is added, and the product boiled for another 10 minutes. Methi, cummin, and mustard seeds, which have been mixed, roasted until they become brown, and ground, are then added, together with pepper and common salt. This mixture is boiled for 20 minutes, with addition of water to prevent scorching, and aromatic leaves such as *Sauropus albicans* are then added with more water, followed by boiling at 220° to 240° F. The temperature is next reduced to 180° F., at which it is maintained for half an hour, and the product allowed to cool for some hours. Fresh fish which has been cleaned, washed, and dried for a few minutes in the sun is added to the amount of 25 to 30 per cent. to the product, and the mixture inserted in tins and subjected to the boiling, sealing, and sterilising steps. The cans may be coated with colourless enamel prior to labelling and packing. An example of the proportions of the ingredients used is given. Meat may be added in place of the fish.

494,071. Yamamoto, S. (trading as Kongsi, H. H. G. [Firm of]).

Latest Patent Applications

37587. McCulloch, A., and Freeman, R.: Vegetable preparation for soup-making. December 28.
37562. Sandlant, H.: Holding, etc., machine for ice-cream, etc. December 24.
37421. Briod, A. E., and East, B. R.: Vitamin concentrates, etc. December 23.
37294. International Yeast Co., Ltd., Meyer, E. A., and Chaffe, P. W.: Manufacture of yeasts. December 22.
37168. Jirotka, B.: Apparatus for peeling pickling onions. December 20.
36916. Brookes, N. E. (Gorton-Pew Fisheries Co., Ltd.): Treating fish livers, etc. December 19.
36819. Peek, Frean and Co., Ltd., and Roberts, L. E. H.: Cleaning of cocoa beans, etc. December 17.

Complete Specifications Accepted

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

493,175. Dantzig, A. Van: Production of readily soluble pasty products for the preparation of sweet dishes, puddings, and the like.
497,678. Deutsche Maizena Ges., and Schlieter, K.: Production of starch from potatoes or starch-containing roots.
497,489. Enock, A. G.: Apparatus for heating and cooling liquid or other food in bottles, jars, or similar vessels.
497,214. Deutsche Hydrierwerke Akt.-Ges.: Method of and means for protecting goods from pests.
497,199. Coffee Products Corporation: Devices for measuring and dispensing liquids and pourable solids.
496,945. Crosse and Blackwell, Ltd., Clayton, W., and Dean, H. K.: Lacquering metal articles. (Cognate application 16910/38.)
496,935. Tallgren, H.: Method of preserving in closed containers foodstuffs or other organic substances.
496,787. Sornet, F., and Etienne, G.: Cheese curds and cheeses, and processes for their manufacture.

NEW COMPANIES

Bentleys (Leeds), Ltd. (347,642.) December 23. Mnfrs. of and dlrs. in confectionery, cooked and prepared foods, etc. £2,000. Dirs.: C. L. Leslie and Miss I. R. Leslie, Tewit Croft, Stray Road, Harrogate; L. K. Clarke, 6, Selbourne Terrace, Knaresborough Road, Harrogate.

Bottling Trades Chemical Co., Ltd. (347,464.) December 19. To take over the bus. and assets of the Bottling Trades Chemical Co., Ltd. (incorporated in 1935), £5,000. Dirs.: A. R. B. Owen, E. J. G. Webb and W. J. P. Dunne.

Britexport, Ltd. (347,591.) December 21. Herring Market, Lowestoft. To promote and protect the interests of fresh herring exporters and packers, etc. Dirs.: R. Boston, A. F. Drake, A. W. Easto, M. W. Greaves, H. E. Johnson, K. MacIver, D. Macrae and five others.

L. J. Button, Ltd. (347,394.) December 16. 74, Knight's Hill, London, S.E. 27. Mnfrs. of chocolate and confectionery, etc. £7,600. Permt. Dirs.: Mrs. A. Button, 299, Leigham Court Road, London, S.W. 16; E. T. Hooke, 297, Leigham Court Road, S.W. 16.

Clark and Leetham, Ltd. (347,368.) December 19. Wholesale, family and general millers and flour shippers, etc. £12,000. Permt. Dirs.: W. Clark and G. Clark, 8, Pryme Street, Hull; R. E. Leetham, Escrick, The Avenue, Branksome Park, Bournemouth; H. R. Leetham, Cranfield House, Southwell, Notts.

Arthur Clarke and Sons, Ltd. (347,322.) December 15. 13-15, Waterloo Street, Leeds, 10. Mnfg. confectioners, etc. £5,000. Dirs.: A. Clarke, W. L. Clarke, A. Clarke, jnr.

Darrall and Co., Ltd. (347,475.) December 19. Grocers and provision mchts., etc. £5,000. Dirs.: N. T. Afford, London Road, Stapeloy, Nantwich; A. T. Wolch, 37a, Hospital Street, Nantwich.

A. E. Hicks and Co., Ltd. (346,957.) December 5. Bread mnfrs., mnfrs. or producers of foodstuffs and provisions, etc. £25,000. Dirs.: Weston Foods, Ltd., A. E. Hicks, R. W. Parker and F. G. Russell.

Homelife Supply Co., Ltd. (347,829.) December 30. Bakers, confectioners and pastrycooks, etc. £1,000. Dirs. to be appointed by the subscribers.

John Kenworthy and Sons (Grocers), Ltd. (347,298.) December 14. Wholesale grocers. £18,000. Permt. dirs.: D. Kenworthy, 18, Clifton Road, Davenport Park, Stockport; J. Kenworthy, 451, Dialstone Lane, Stockport; T. Kenworthy, 65, High Grove Road, Cheadle, Cheshire.

Moorhouse Bros., Ltd. (347,522.) December 20. 4, Back Guildford Street, Liverpool. Mnfrs., bottlers and distributors of mineral waters and vinegar. £5,000. Permt. Dirs.: A. E. Moorhouse, 30, Speedwell Road, Claughton, Birkenhead; H. Moorhouse, 15, Buckingham Road, W. Derby, Liverpool.

Naphos Distributors, Ltd. (347,351.) December 15. 11, Broadwater Road, Welwyn Garden City, Herts. Mnfrs. of and dlrs. in foodstuffs, chemical compounds, etc. £5,000. Dirs.: W. L. Lordan, F. W. Hinckley, S. McCombie.

John Stephenson (Casings), Ltd. (347,914.) December 31. The Model Factory, Mosley Road, Trafford Park, Manchester, 17. Sausage casing mnfrs., etc. £5,000. Dirs.: J. Stephenson and Audrey A. Stephenson.

Stillmore Manufacturing Co., Ltd. (347,578.) December 21. 61, Weston Lane, Greet, Birmingham. Wholesale and retail grocers and provision mchts., dlrs. in egg and egg products, canned goods, cereals and patent breakfast and infant foods, etc. £5,000. Dirs.: C. E. Jenkins, Mrs. A. Jenkins, E. C. Jenkins, L. A. Jenkins.

A. F. Timmins, Ltd. (347,373.) December 16. 24 and 26, Albert Road, Aston, Birmingham. Wholesale grocers and provision mchts. £10,000. Permt. Dirs.: H. A. Timmins, 346, Chester Road North, Sutton Coldfield; F. A. Timmins, 49, Redacre Road, Sutton Coldfield.

Union Food Machinery and Equipment, Ltd. (347,992.) January 2, 1939. 46-47, London Wall, E.C. 2. Mnfrs. of machines relating to the manufacture, preparation, curing and cutting of food, etc. £1,000. Dirs.: M. J. Lucey, G. A. Rickards.

The above-mentioned particulars of new companies registered are taken from the Daily Register compiled by Jordan and Sons, Ltd.

TRADE MARKS

AMYLONE.—601,626. **A syrup for use in the baking trade in the manufacture of bread, cakes, and confectionery.** AMYLON, LTD., Haymerle Works, Haymerle Road, Peckham, London, S.E. 15. December 28.

BANNERET.—602,552. **Bacon and hams and preserved meat in tins.** BROWN AND KNIGHT, LTD., 9a, Lower Marsh, Lambeth, London, S.E. 1. December 14.

DIDO.—601,212. **All goods in Class 30, which includes coffee substitutes, flour, preparations made from cereals, bread, biscuits, cakes, pastry and confectionery, yeast, and baking powder, but not including sauce or flavourings for beverages, and not including any goods of the same description as sauce or flavourings for beverages.** SIDDALL BROS., LTD., Wesley Street and Manor Street, Stoke-on-Trent. December 21.

EPOCA.—601,372. **Bread and biscuits (not being food for animals).** KAVLI, LTD., 53, Nelson Avenue, Nelson Village, Cramlington, Northumberland. December 14.

FOUR RAY.—602,753. **Edible oils and edible fats.** BENNINGA (MITCHAM), LTD., 33, Mortimer Road, Mitcham, Surrey. December 28.

HORIZON.—603,002. **Table jellies.** FRANK DARBY, 9, Welford Road, Leicester. January 4.

Table jellies and goods of the same description will be struck out from the goods of Registration No. 255,868 (1326) xlii if and before the applicant's mark is registered.

INGLE-VITA.—601,005. **Biscuits, not being food for animals.** INGLIS AND CO., LTD., 33, Eliza Street, Belfast, Northern Ireland. December 14.

KWIX.—B 586,677. **Cereal products for food.** QUAKER OATS, LTD., Bridge Road, Southall, Middlesex. (By Consent.) January 4.

NAZDAR.—601,364. **Preserved hams, pork, and sausages.** SELECTED IMPORTS, LTD., 8/10, Lower James Street, Golden Square, London, W. 1. December 21.

SILVER SPOON.—600,523. **Dried milk, milk powder (for food), dried cream, soup powder, soups, and soup extracts.** JOSEPH LINGFORD AND SON, LTD., 5, Durham Street, Bishop Auckland, Durham. (Associated.) (By Consent.) January 4.

SPRING BLOSSOM.—601,513. **Margarine.** SUOMEN TUKKUKAUPPIAIDEN OSAKEYHTIO, Aleksanterinkatu 19, Helsinki, Finland. January 4.

STEADY.—B 602,048. **Dried fruits, canned fruits and canned vegetables.** CONSOLIDATED PRODUCE CO., LTD., Los Angeles Wholesale Terminal Market Court, Seventh Street and Central Avenue, Los Angeles, California, United States of America. (Associated.) December 14.

SUNNY SOUTH.—600,678. **Honey.** THE PRODUCERS' CO-OPERATIVE DISTRIBUTING SOCIETY, LTD., Corner of Quay and Valentine Streets, Sydney, New South Wales, Australia. December 28.

Registration of this trade mark shall give no right to the exclusive use, either separately or in combination, of the words "Sunny South" and the devices of bees.

TOSCA.—602,755. **Edible oils and edible fats.** BENNINGA (MITCHAM), LTD., 33, Mortimer Road, Mitcham, Surrey. December 21.

VATEXA.—600,322. **Edible fats.** THE LONDON OIL BUYERS' CORPORATION, LTD., 161, Camberwell Grove, London, S.E. 5. (By Consent.) December 21.

VITA SUGAR.—601,611. **Preparations of glucose in powder form for use as an ingredient in food.** GERALD DALTON DEBENHAM, 9, Church Path, Woking, Surrey. December 14.

This list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal", and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).